

**The Reverse Transference of Innovation of Foreign Subsidiaries of Emerging  
Multinationals**

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## **The Reverse Transference of Innovation of Foreign Subsidiaries of Emerging Multinationals**

### **Abstract**

*The role of subsidiaries of emerging multinational corporations (EMNC) should not be passive and just follow the guidelines of the parent company. On the contrary, EMNCs should have an entrepreneurial role developing innovations that add value to the entire corporate network. In order to convert the reverse innovation into results for the corporation, it is necessary for this competence to be recognized and legitimized by the parent company. Based on that, this study aims at understanding what factors allow the subsidiaries of EMNCs to develop innovations used by the parent company, that is, what factors drive reverse innovation. The article suggests that the reverse transfer of innovation relies on (i) the strategic orientation of the foreign subsidiary's R&D function; (ii) the strong integration (communication) between the parent company and subsidiaries, (iii) the entrepreneurial orientation of the company, besides being related to two factors: the entry mode and the subsidiary's period of existence. The respondents of the survey were Brazilian multinationals with manufacturing activities or professional service abroad. The study started as of a base with 46 operating Brazilian multinationals until the year 2006. Out of this base, 30 multinationals agreed to participate in the survey. Overall, they had 93 subsidiaries. From the 93 subsidiaries involved, 66 foreign subsidiaries answered the questionnaire. Then the paper uses a data of 66 subsidiaries. The hypotheses were tested through the statistical techniques of correlation and multiple linear regressions. The results confirm the five hypotheses with an explanatory power of approximately 74%. Therefore, the results show that the reverse transfer of innovation depends on the strategic orientation of the foreign subsidiary's R&D function; the strong integration (communication) between the parent company and subsidiaries; the entrepreneurial orientation of the company, the subsidiary's period of existence and the entry via greenfield investments. The implications of this result will be analyzed in two aspects: the impact on the literature regarding the management of multinational corporations and R&D internationalization and the consequences for the internationalization strategy of EMNCs, in particular, Brazilian EMNCs.*

## **1. Introduction**

Until recent times, the transference of innovations in multinationals would come from industrialized countries to developing countries and, similarly, from the parent company to the subsidiaries. However, the increasing internationalization of companies, and consequently, the increasing decentralization of R&D units change the situation. Today technology transference happens in several directions, contrary to the traditional directions, from developing to developed countries, and from subsidiaries to parent company. Corroborating this idea, several authors argue that the main reason for the existence of the multinational corporation (MNC) is its capability to internally resources and transfer knowledge and technologies within the network more effectively than the market mechanisms (Dunning, 1980; Birkisnhaw; Hood, 1998; Foss; Pedersen, 2002)

Therefore, instead of being entirely performed in a single unit, especially in the parent company, the innovation in MNCs takes place in several subsidiaries located in different countries, mainly to exploit the competitive advantages of each country involved. The tendency to engage different countries, decentralizing the development of R&D, is given by two factors: market factors (market access, responding to local demand and increasing proximity to customers); and technology factors (recruitment of qualified staff, access to foreign talent and differentiated technologies) (Chiesa, 1995). Or even as consequences of decisions not directly related to innovation activities, such as mergers and acquisitions, political pressures and incentives from subsidiaries' host countries (Gassmann; Von Zedtwitz, 1999).

For over a decade, a study by Davidson and Harrigan (1977) already indicated that from a sample of 733 new products launched by 44 large U.S. companies, between 1945 and 1976, 72% were launched abroad. In recent years, the reverse innovation – mentioned here as innovations made in the subsidiaries and ideally absorbed by the parent company, seems to take strength in the discussions on MNCs (Minbaeva, et al., 2003; Yang, Mudambi, Meyer, 2008; Minbaeva, 2008).

If the reverse innovation is essential to keep the competitiveness of traditional multinationals, it seems even more crucial for the competitiveness of emerging multinationals (EMNC). That is because, instead of go abroad to exploit pre-existing advantages, EMNCs internationalize seeking the acquisition of new advantages and capabilities (Mathews 2002; 2006; Ramamurti, R.; Singh, 2009; Guillen; Garcia-Canal, 2009). In other words, EMNCs not only need to seek

and develop capabilities outside their country of origin, but also they need to do it much quicker than traditional multinationals (Borini; Fleury; Fleury, 2009).

Therefore, the role of subsidiaries of EMNCs should not be passive and just follow the guidelines of the parent company. On the contrary, EMNCs should have an entrepreneurial role developing innovations that add value to the entire corporate network. However, how to make the subsidiary develop global responsibilities in the development of innovation activities that are recognized by the multinational corporation (MNC)? One point that deserves attention is that it is not enough for the subsidiary only develop innovation capabilities. In order to convert the reverse innovation into results for the corporation, it is necessary for this capability to be recognized and legitimized by the parent company (Frost, Birkinshaw, Ensign, 2002; Anderson; Forsgren, 2000).

Based on that, this study aims at understanding what factors allow the subsidiaries of EMNCs to develop innovations used by the parent company, that is, what factors drive reverse innovation. The article proposes the reverse transfer of innovation relies on (i) the strategic orientation of the foreign subsidiary's R&D functions; (ii) the strong integration (communication) between the parent company and subsidiaries, (iii) the entrepreneurial orientation of the corporation; besides being related to two factors: the entry mode and the subsidiary's period of existence.

## **2. Theoretical Background**

The definition of innovation is quite comprehensive and involves not only the development of new technologies translated by new products and processes, but also organizational and marketing innovations (OCDE, 2005). However, this study only mentions innovations related to research and development.

Initially, the internationalization of R&D was not directly related to any global strategy of the multinational. Instead, it was mainly the result of accidental actions of the MNC, either by adding international R&D centers, or by the natural evolution of the productive activities of the subsidiaries that require a certain R&D expertise, that is, by requiring governments pressuring the subsidiary to locally develop some kind of technological activity (Ronstadt, 1978; Chiesa, 1995). The reason for the internationalization to only occur by accident was mainly related to the security issue of crucial resources to the competitiveness of companies (Chiesa, 1995). Over the years, that has changed and today the R&D internationalization is

not only due to strategic deliberations, but is also seen as a key factor to increase the firm's capability to innovate (Chiesa, 1995; Gassmann; Zedtwitz, 1999; Reddy, 1997).

In particular, the R&D internationalization in emerging multinationals derives from the technological factor, that is, the search for strategic resources abroad (Bonaglia; Goldstein, 2007; Mathews, 2006). The internationalization of emerging multinationals is not based on own resources to be exploited internationally, but in the search, "capture" and exploitation of resources located around the world (Mathews, 2006).

Therefore, it is clear that the perspective of a differentiated competitive strategy of emerging multinationals disagrees with the central premise of the economic paradigm that sees the foreign market as an extension of the domestic market, and according to which the market should be explored and the resources that formerly guaranteed competitiveness in the domestic market of origin should be extended to subsidiaries (Vernon, 1966). Emerging multinationals can and should exploit the parent company competences and build local competences; however, the competitiveness is only ensured if the company reverses the order of values and develops the capacity to globally take advantage of the competences developed in the subsidiaries.

Thus, the core issue regards which organizational factors are influencing the development and reverse transfer of competences in R&D and innovation in foreign subsidiaries of EMNCs. The article suggests that the organizational factors influencing the reverse transfer of innovation competences are (i) the strategic orientation of the foreign subsidiary's R&D area; (ii) the strong integration (communication) between the parent company and subsidiaries; (iii) the entrepreneurial orientation of the company; besides being related to two factors: the entry mode and the subsidiary's period of existence.

## **2.1 The Strategic Orientation of the R&D Function in Foreign Subsidiaries**

Studies on the strategic importance of subsidiaries investigate which factors allow greater or lesser strategic relevance of the unit before the other subsidiaries in the multinational company. Enright and Subramanian (2007) present a summary of the diversity of studies that show the roles and factors that influence the strategies of foreign subsidiaries. Oliveira Jr., Boehe e Borini. (2009) suggest a specific typology to the Brazilian environment, according to the factors of the competitive environment, the relationship between parent company and subsidiaries and the initiatives of affiliates.

Both the specific studies for the Brazilian context and the number of typologies of foreign subsidiaries located in several countries have surpassed the studies of the last decade (Enright, Subramanian, 2007). However, at the beginning of the current decade, towards a better understanding of the strategies of subsidiaries, the concept of centers of excellence emerged, which despite being coordinated by a central corporate strategy, are not necessarily established in the parent company, but set up in locations prone to the generation of innovation and knowledge. (Andersson; Forsgren, 2000; Frost, Birkinshaw, Ensign, 2002).

The change regarding the typologies of the subsidiaries' strategies focused on the approach. The concept of center of excellence advocates it is impossible to determine a strategic role for the entire subsidiary as the typologies hitherto propagated. On the contrary, a subsidiary may take on different strategic roles according to their organizational functions. Therefore, in the same subsidiary, the R&D function may play a role as a center of excellence by exercising a global guideline regarding the creation of knowledge in R&D, while the production area may simply be an implementer of strategies centered on the parent company. Thus, the concept regarding the center of excellence focuses on the issue of organizational capabilities in terms of its innovative character for the global corporation (Rugman; Verbeke, 2001). Therefore, the study approach has become the organizational capabilities, in particular, those related to R&D areas (Cantwell; Mudambi, 2005) and the development of processes and products (Andersson; Forsgren, 2006) in the marketing, production and engineering areas.

Studies involving subsidiaries in Brazil or subsidiaries of Brazilian multinationals have exploited this aspect. Gomes (2003) conducted a study showing the decentralization of R&D activities in the telecom industry in Brazil. The integration of R&D laboratories expanded by information and communication technologies (ICTs) is pointed as being essential for the evolution of R&D activities for the adaptation to create technologies.

Boehe (2007) presents a typology for the development of products of foreign subsidiaries in Brazil. The results indicate five types of units of product development significantly different (local adapters, new innovators, local innovators, innovators for emerging markets and global innovators). The highlight is the presence of regional and global innovative subsidiaries (for emerging markets) that perform the role of centers of excellence.

Analyzing the product development, Oliveira Jr. Boehe e Borini (2009) present another typology concerning the knowledge dependence of the subsidiary before the parent company and vice versa. In a square parent company, the result shows the integrated units (18% of the sample) as representatives of the so-called centers of excellence. These subsidiaries perform

the product development capabilities for the global scope. They are provided with a more mature department in terms of subsidiary's period of existence as compared to others, thus being consistent with Borini and Oliveira Jr. (2007), and characterized by a high autonomy and placed in a corporate environment of high internal competition. In the same line, Amatucci and Bernardes (2009) confirm the presence of product development centers in the Brazilian automotive industry by drawing attention to external factors.

In relation to Brazilian multinationals, it appears that foreign subsidiaries in Brazil are investing both in R&D and production (Gomes, et al., 2010). This is a clear representation of the perspective evolution of excellence centers. Since for the R&D function, the subsidiary's strategies favor the proliferation of innovative units with strategic importance (Borini, Fleury, Fleury, 2010).

Therefore, it is reasonable to expect that R&D function with innovation in products and processes (Boehe, 2007; Oliveira Jr, Boehe, Borini, 2009) – rather than the adaptation of processes and products – are more likely to have their innovations accepted and used by the parent company.

*H1: The reverse transfer of innovation relies on foreign R&D functions characterized by a strategic orientation for the global innovation.*

## **2.2 The integration between the parent company and subsidiaries for the implementation of international R&D**

The organizational communication is vital to reduce the uncertainty and disseminate knowledge (Johanson; Vahlne, 1977). More specifically, the communication is a mechanism to reduce the uncertainties of the innovative process (De Meyer, 1985; Allen, 2007; Moenaert; Souder, 1990). This is because the activities with higher level of uncertainty, a typical situation of R&D activities, require a greater exchange of information during its performance compared to those with low uncertainty levels (Daft; Lengel, 1986; Loch; Terwiesch, 1998).

Previous studies on R&D projects show that efficient and effective communication is a prerequisite for the success of these projects (Moenart *et al.*, 2000). Other studies conclude that many of the problems that lead the developed projects to failure arise from the poor communication between team members (Allen 2007; Moenart *et al.*, 2000; Sosa *et al.*, 2002). Moreover, when it comes to projects developed by teams dispersed worldwide, the lack of communication and trust may be one of the factors driving the reasons for the failure of innovation projects (Pinto; Pinto, 1990).

Despite the communication importance for the success of R&D projects, when conducted between dispersed units, they face a number of additional communication challenges caused mainly by geographical distance, cultural differences and language, and the lack of trust between distant teams (Sosa et al., 2002). All these aspects reduce the frequency and intensity of communication. Paradoxically, the reduction of the communication frequency is particularly problematic in environments of rapid changes operating with constant technological innovations (Herbslesb; Mockus, 2003).

The communication between the dispersed units is made possible by increasing the capacity to process information arising from investment in information technology and communication. However, although the mechanism is effective to increase the capacity to process information, the direct or face-to-face communication is evaluated as the most efficient method, besides being the simplest way to exchange knowledge (Nohria; Ghoshal, 1997). Most researchers in this area agree that electronic communication does not replace face-to-face contact. However, many argue that it helps to extend the period in which teams can remain without this sort of meeting and still keep a certain level of reliability (De Meyer, 1991; Boutellier *et al.*, 1998). Although electronic communication implies the loss of spontaneity and the subtle face-to-face interaction ways (Herbslesb *et al.*, 2000), it seems to be essential for the success of this type of work.

In a study based on the analysis of fourteen large multinationals, De Meyer (1991) identified best practices that would help increase the interaction between global R&D teams: (i) socialization among members - carried out with the temporary transfer of staff between units; constant traveling; (ii) implementation of roles and procedures to increase the formal communication - with the exchange of reports and documentation, and the establishment of plans with formal procedures in order to stimulate the communication between the teams. (iii) implementation of gatekeepers – definition of a technology coordinator or a person in charge of being the link between team members. (iv) implementation of a team explicitly responsible for the communication process between the units; (v) development of an organizational network – in this option, instead of leaving the information exchange under the responsibility of a few people, every person in the network “links” is able to perform this role and the information flow would follow a decentralized “route”. (vi) electronic communication – even though the electronic communication can not replace the individual face-to-face communication, it may help to slow the decline of confidence among members.

Birkinshaw and Nobel (1998), by examining the issues of the communication between subsidiaries and parent company in the R&D units of multinationals, have shown that the most integrated subsidiaries (Birkinshaw; Morrison, 1995), that is, with a higher degree of communication and socialization, developed a higher number of skills (knowledge) as compared to the subsidiaries that only implemented innovations.

Birkinshaw and Morrison (1995) also show that the stronger the relationship between the parent company and subsidiary, the smaller the chances of a lower investment contribution in the subsidiaries or the rejection of the subsidiary projects. The divestment decision becomes much more difficult the more the businesses, contacts and working relationship between the parent company and subsidiary are coupled up. There is a higher credibility in the future of the subsidiary and in the development of skills, because the stronger the working relationship and the degree of normative integration between the parent company and subsidiary, the lower the chance for the subsidiary not to be in line with the corporate strategies, or below the essential competences in order to maintain its strategic position within the corporation (Birkinshaw, Morrison, 1995; Nohria; Ghoshal, 1997).

Papanastassiou and Pearce (1994) also note that subsidiaries that obtain global mandate for R&D should credit it to their different capacities and a strong relationship with the parent company.

Therefore, the strong integration drives the development of skills, since the parent company has more confidence on the subsidiary and realizes the opportunities for the development of nonlocal skills outside the country of origin. Thus, a higher investment is directed towards the development of competences in the subsidiaries, since it is a reliable place for corporate strategic functions.

*H2: The reverse transfer of innovation relies on a strong integration (communication) between the parent company and subsidiaries*

### **2.3 Entrepreneurial Orientation**

The concept of entrepreneurial orientation suggested in this article focuses on the analysis of corporate entrepreneurship, or entrepreneurship widespread in the corporation allowing the entrepreneurial actions of employees, arising from the stimulation and support of the visionary character each one in the company has (Fillion, 2006). This visionary character can be defined as a set of perspectives about new businesses, products and processes that are developed over the years, until the emerging perspectives are in line for a central perspective

of the business, product or process to be undertaken. A process that requires time and a corporate culture, with space for corporate entrepreneurial perspectives. Entrepreneurship requires much more space and regular working time from the employee, and only comes into effect with the existence of reciprocity of the institution for the entrepreneurial actions (Fillion, 2006).

Thus, the entrepreneurial orientation refers to the positive bias of the company to new business opportunities. It is essential for the creation and development of initiatives and competences in the subsidiaries (Birkinshaw; Hood, 1998), but it is much more than the creation of a new business, or a new producing method. It involves credibility and freedom issues for making risky decisions (Birkinshaw, 1997) and suggests a company's willingness for a proactive activity in face of a decision-making environment at risk (Birkinshaw, 1997).

The characteristics of the entrepreneurial orientation are:

- 1) The support and experience of senior management in entrepreneurial activities aimed at creating a stimulating organizational environment for new business ideas and practices (Birkinshaw, 1997).
- 2) The risk is a positive attribute; if well calculated, the failure of entrepreneurial activities is not a synonym for poor performance, but for an organizational process to create new opportunities (Birkinshaw, 1997; Birkinshaw, Hood, Jonsson, 1998).

The relationship between the entrepreneurial orientation and the development of skills stems from the company's need to be constantly rebuilding its businesses and processes in a continuous and emerging manner (Mintzberg, 1989). Although the company's founder is an entrepreneur, his views are fated to fail if there is support from the employees responsible for the implementation of the great view and the creation of complementary views that sustain the enterprise over time (Fillion, 2006).

An example is the Odebrecht company. Norberto Odebrecht property development, one of the Brazilian leading contractors, currently develops projects in 15 countries besides Brazil: Angola, Argentina, Bolivia, Chile, Colombia, Djibouti, Ecuador, United Arab Emirates, United States, Mexico, Peru, Portugal, Dominican Republic, Uruguay and Venezuela, with over 23.000 employees in projects to build hydroelectric plants, sewage systems, water supply systems, transmission lines, airports, subways, bridges and roads, among others. The highlight of such domestic company is the managerial technology known as TEO (Odebrecht Entrepreneurial Technology), a philosophy based on four vectors: spirit of service, human factor, concepts, principles and criteria and, lastly, the production of material and moral

wealth. The legacy of this culture is the belief that the company should be increasingly based on innovation, creativity and human imagination, which constitute the raw material of the new economy (Mazzola; Oliveira Jr, Giao, 2006).

Therefore, it is expected that:

*H3: The Reverse Transfer of Innovation relies on a strong entrepreneurial orientation provided by the parent company.*

## **2.4 The mode of entry**

By deciding to operate in the international market, the MNCs decide as for the election of country, type of operation and mode of entry abroad. The entry modes can be divided into two main groups: (i) equity arrangements involving joint ventures and wholly owned subsidiaries, acquisitions and greenfield: (ii) non-equity arrangements involving exports and contractual agreements – licensing, franchising, strategic alliances and R&D contracts (Deresky, 2004; Tanure, Duarte, 2006).

Given that the focus of this study was to analyze the Brazilian multinational companies with production operations abroad, the modes of entry contemplated in our research are the result of equity arrangements - joint ventures, acquisitions and greenfield. Joint ventures arise from the combination of two or more companies aiming at a joint production of goods and/or services. In these cases, the control and property are then owned by both parties, but none of them loses its original and legal personality. This partnership allows companies to share profits, resources and risks arising from the joint operation (Cerceanu; Lara; 1999; Deresky, H., 2004). Thus, they constitute an interesting option, especially for multinationals of emerging countries and that wish to access new resources (Mathews, 2006).

When a multinational company wants to take full control of its operations abroad, it may choose to carry out acquisitions made through the purchase of an existing industrial plant abroad or via greenfield, characterized by the creation of a new operation including the construction of the production plant, purchasing equipment and hiring new employees. These two options are the ones involving the greatest resource commitments, and therefore, the greatest risks. The downside is that the possibility of achieving good results for the corporation is also higher as compared to other modes of entry, as the market share is more complete. Despite the high cost, the acquisition may be a good option in order to quickly access the local market. The greatest challenge in this case is to deal with the cultural differences at the integration of both the acquired and the buyer company. On the other hand,

the option of starting a business from scratch involves high investment risks regarding time and resources, but it allows the multinational a greater flexibility and control of activities related to the choice of resources, choice of production technology, layout, etc. (Cerceanu; Lara; 1999; Deresky, 2004; Tanure, Duarte, 2006).

A study by Brouthers and Brouthers (2009), which used samples of Japanese multinationals based in Europe, suggested that organizations that have developed strong intangible capacities are able to leverage their knowledge more effectively within the network if they do so through the establishment of greenfields.

*H4: The reverse transfer of innovation comes mainly from foreign subsidiaries that entered through greenfield investments*

### **2.5 Subsidiary's period of existence**

Foss and Pedersen (2002) argue that older subsidiaries tend to have more autonomy and to be more innovative. Theoretically, the oldest subsidiaries have a higher probability of developing R&D competences, not to require the competences transferred from the parent company. On the other hand, such autonomy and independence in the development of competences could be detrimental to the competences recognition.

Nevertheless, by considering the subsidiary's period of existence, it is necessary to be careful with respect to specific subsidiaries arising from acquisitions because, although they are new to the corporation, these companies have their own trajectory to develop competences. However, although these subsidiaries are able to develop competences with greater intensity at its initial stage, the lack of skill alignment towards the general guidelines of the corporation tends to characterize the skills and competencies developed without global importance. Over time, the competences can be aligned with the corporate guidelines and are classified as recognized or likely to reverse transfer. Thus, it is reasonable to expect that:

*H5: The reverse transfer of innovation comes mainly from foreign subsidiaries that have a longer period of existence abroad.*

## **3. Methodology**

The respondents of the survey were Brazilian multinationals with manufacturing activities or professional service installed abroad. This choice excludes from the analysis any commercial representations, stores or distribution offices abroad. Thus, based on secondary surveys in several domestic mailings, in particular, Editora Análise, and in Unctad and Cepal studies, we observed that 46 Brazilian multinationals were active until the year 2006.

Each company was personally contacted to explain the research objectives and expected results. In total, 30 multinationals agreed to participate in the survey.

The survey was conducted in two stages. In the first stage, a questionnaire related to the parent company activity was sent, to be answered by the CEO or the head of the International Business area of the company. Each parent company should answer at least one questionnaire for each relationship with subsidiaries. As this is a new and emerging process, mostly focused on the treatment of the parent company with the subsidiaries, it was considered even by the respondents.

The first step was the most time consuming, as it was necessary to convince the president or board of the company to participate in the survey, and then get the parent company approval and indication so that the subsidiaries could take part in the survey.

The second step was to establish contact with each country manager of the subsidiaries of these 30 companies, a total of 93 subsidiaries and an average of 3 subsidiaries per company. The contacts were submitted by the respondents in the parent company and a general authorization was given by the presidency for the completion of the questionnaires. Out of these companies, some had only one subsidiary and others eight foreign subsidiaries. Out of the 93 subsidiaries involved, 66 foreign subsidiaries completed the questionnaire, which were returned through the Internet, with phone supervision so as to answer the questions of the respondents. The data collection lasted eight months: from December 2006 to July 2007.

The sample consists of 79% Brazilian manufacturing multinationals and 21% services business. Abroad, 42% of the BrMNs performs manufacturing activities, 33% develop technology-intensive professional services and the remainder (25%) performs both activities.

The subsidiaries of BrMNs are mainly located in Latin America (35%), followed by Europe (17%) and North America (15%). Individually, the country with the largest number of subsidiaries is the U.S. (15%), followed by Argentina (14%) and Mexico (8%). China (7%) already stands as a major destination of our subsidiaries.

As for the markets served, 40% of the subsidiaries are exclusively focused to serve the host country. The market that represents the largest destination of sales is Latin America (33%), followed by Europe (23%) and North America (23%). Africa is the market of 15% of the subsidiaries, and Asia, Eastern Europe and the Middle East each account for 10% of the market share of subsidiaries.

The entry mode of BrMNs abroad is divided into acquisitions (58%) and direct investment (42%).

The BrMNs are still newcomers in the global market: 50% started their operations abroad after 1999 and the remaining 30% in the 90s. Thus, 80% of subsidiaries are operating for over 15 years abroad.

## **2.1 Construction of variables**

The dependent construct of the equation that represents the reverse transfer of innovations consists of four variables (Frost, Birkinshaw, Ensign., 2002) on a scale of agreement from 1 to 5. The first two verify the intensity of skill development in (1) R&D abroad and (2) innovation in foreign subsidiaries. The other two verify how much the capabilities of (3) R&D and (4) innovation are recognized and used by the parent company ( $\alpha = 0.835$ ).

The independent constructs are three R&D of base, integration and entrepreneurial orientation. They are all in a 1-5 scale of agreement.

The construct Strategic Orientation of R&D of base is due to three variables (based on Oliveira Jr, et al., 2009) which investigated the orientation of the MNC for the delegation of the following activities in the subsidiary: (1) applied research in the development of new products (2) development of new processes, and (3) prototyping of new products ( $\alpha = 0.948$ )

The integration construct was built by the following variables (Birkinshaw; Hood; Jonsson, 1998): strong working relationship, trust delegated to subsidiary; exchange of information; understanding of the subsidiary's responsibilities by the parent company. Cronbach's Alpha is 0.852.

The independent variable entrepreneurial orientation was constructed by the following variables (Birkinshaw; Hood; Jonsson, 1998): there is the support for entrepreneurial activities; there is the incentive for risk-based decision-making; 'taking on risks' is considered a positive attribute; top management has experience with innovation activities. Cronbach's Alpha is 0.892.

The control variables are two: mode of entry, subsidiary's period of existence.

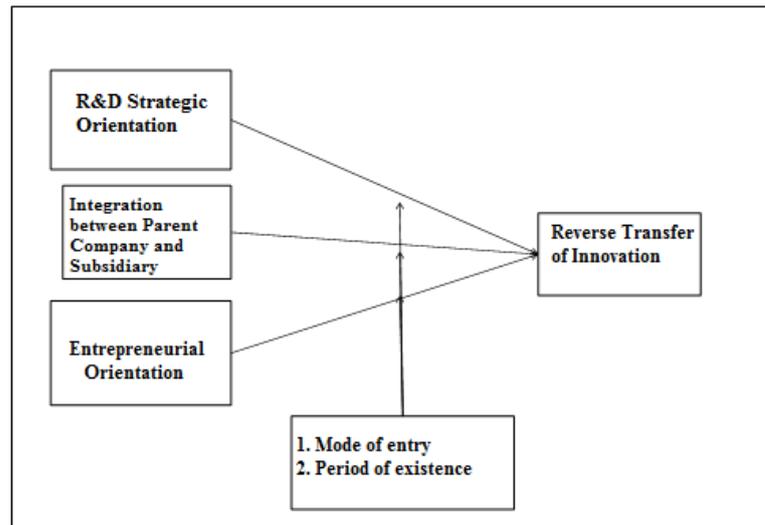
The entry mode is formed by a dummy variable Acquisition (0) and Greenfield Investments (1)

The subsidiary's period of existence is measured by the establishment year of the subsidiary abroad minus the year 2010. The resulting variable is the age of the subsidiary

abroad. Subsidiaries are on average 12 years old. For the variable existence period, the normality is obtained by extracting the variable log

Figure 1 presents the analytical structure of the variables considered in the study.

**Figure 1: Reverse transfer of innovation in foreign subsidiaries**



Source: authors

### 3. Results

Table 1 shows the correlation between independent and study control variables. It also presents the distribution of descriptive means and standard deviations. The goal is to investigate the behavior of the variable and whether there is a strong correlation between them that could indicate multicollinearity.

**Table 1: Descriptive measures and correlation**

Reverse Transfer of Innovation						
	Mean	Deviation	1	2	3	4
1. R&D Strategic Orientation	2.50	1.40	1			
2. Integration	3.90	0.91	0.154	1		
3. Entrepreneurial Orientation	4.10	0.89	0.118	.271(*)	1	
4. Period of Existence (ln)	1.94	1	.393(*)	-0.04	.255	1

\*p<0.05;      \*\*p<0.01

Source: authors

It is observed that independent variables are not significantly correlated. Except for the entrepreneurial orientation and integration, however, the correlation is weak. The same occurs for the variable period of existence and R&D of base and entrepreneurial orientation.

It is also observed that the intensity of investment and incentives for Strategic Orientation of R&D in foreign subsidiaries is very low. This means that the investments in the innovation of products and processes in the subsidiaries are still small and there is certainly a completely autonomous development within the subsidiaries.

The regression model (table 2) tests the proven hypothesis. Model 1 only indicates the dependent variables and the other models add the control variables. The latest model is provided with all variables (dependent and controls).

**Table 2: Regression**

Reverse Transfer of Innovation					
	1	2	3	4	VIF
Constant	-0.987	-0.942	-1.859	-1.834	
R&D Strategic Orientation	0.485**	0.468**	0.416**	0.396**	1.198
Integration	0.331*	0.331*	0.471**	0.474**	1.305
Entrepreneurial Orientation	0.310*	0.277*	0.279*	0.242*	1.077
Entry Mode		0.429!		0.454!	1.045
Period of Existence (ln)			0.316*	0.324**	1.391
F	13314**	11427*	14896*	14614*	
R2 adjusted	0.606	0.635	0.698	0.739	
! P<0.10; * p<0.05; **p<0.01				Source: authors	

Overall, the models indicate a positive adjustment (F) and explanatory power (R2), and the general model (4) presents an explanatory power of approximately 74%.

The reverse transfer primarily depends on the development of activities regarding the Strategic Orientation of R&D in subsidiaries. That means R&D activities that do not simply focus on the adaption of products and processes of the parent company abroad, but an R&D function directed towards the creation of new products and processes in the foreign country. This result confirms H1

Confirming H2, the reverse transfer depends on the integration, that is, on the strategic alignment of the subsidiary's activities with the parent company's interests and the constant exchange of information, knowledge and experience of counter parties.

The entrepreneurial orientation serves as the background to stimulate a culture that supports the innovation risk as one of the main corporate guidelines advocated and propagated by the parent company, which confirms H3.

Finally, H5 is confirmed, once the older subsidiaries are more likely to accomplish the reverse transfer, as well as those who entered through greenfield investments marginally collaborate to the reverse transfer of innovation, confirming H4.

Therefore, the results show that the reverse transfer of innovation relies on the strategic orientation of the foreign subsidiary's R&D function; the strong integration (communication) between the parent company and subsidiaries; the entrepreneurial orientation of the corporation, the subsidiary's period of existence and the entry through *greenfield investments*. It is not only the fact that the structuring of the subsidiary's R&D function is vital for the reverse transfer, but also the ability to develop product and process innovations and not a simple adaptation. Although not in large scale, the Brazilian EMNCs - seeking resources from operations abroad - adopt the subsidiaries' innovations especially created by units that entered via greenfield and have been operating longer abroad. The entry via greenfield allows greater alignment of the parent company's activities with the subsidiary, which aligned to the period of operation, enables a greater integration of the company to the business network abroad for the creation of innovative resources (Borin, Fleury, Fleury, 2010).

The integration is essential for the exchange of knowledge and the parent company's support for the subsidiary's innovations. Subsidiaries without such integration may have their initiatives abandoned and not sponsored within the corporate network (Borini, Fleury, Fleury 2009).

However, the support for innovations, in addition to a strategic R&D function and the integration between the parent company and subsidiaries is the entrepreneurial culture of the parent company reapplied to the subsidiaries. Such entrepreneurial orientation allows foreign subsidiaries to take the necessary risks (Birkinshaw, 1997) for innovation activities, which aided by the integration can be used by the parent company and other subsidiaries.

## **6. Discussion**

The implications of this result will be analyzed as for two aspects: the impact on the literature regarding the management of multinational corporations and R&D internationalization and the consequences for the internationalization strategy of EMNCs, in particular, Brazilian EMNCs.

The result reinforces the survey with respect to the reverse innovation; however, it indicates innovative elements to understand the factors that enable it. First, there is the fact of the R&D strategic orientation. The result shows and reinforces the perspective of centers of excellence, that is, the focus of analysis should not be the subsidiary as a whole, but each specific area.

Another aspect refers to integration. A tradition in R&D studies focuses on the innovation associated with the centralization and decentralization of subsidiaries (Ronstadt, 1978; Reddy, 1997; Chiesa, 2000). However, this article does not address the autonomy and integration in terms of structure. On the contrary, it adds to the literature the fact of integration associated with communication and socialization as a way to strategically align the parent company and subsidiaries.

The entrepreneurial orientation aspect aligned with the subsidiaries' initiative, despite being previously studied (Birkinshaw, 1997; Birkinshaw, J. Hood, 1998), including with EMNC (Borini, Fleury, Fleury, Oliveira Jr, 2009), gains unprecedented outlines, because until then its influence on R&D innovations had not been tested.

A second aspect to be analyzed is the reverse innovation of innovations in EMNCs. Although studies propagate the search for resources abroad and that the result of this article confirms this assumption for EMNCs, two factors deserve special attention: the mode of entry and the period of operation. The results show that operations consisting of greenfield investments have a higher propensity for reverse innovation and not the opposite as some argue (Mathews, 2006; Guillén; Garcia-Canal, 2009) explaining that the acquisition would be mainly directed towards the search for innovations abroad. Innovation can be a source of market access and innovations for the local market, but the results show that innovation is due to global investments arising from greenfield investments.

On the other hand, the results show that the search for resources abroad relies on time. Theoretically, this time results from the company's access to the local market, the market learning, innovation development and test in its market and after its local success, the transformation of local innovation into global innovation. Again, this aspect points out the analysis of centers of excellence versus the subsidiary as a whole. The vast majority of theories on EMNCs (Mathews, 2006; Guillén; Garcia-Canal, 2009; Ramammurti, R., Singh, 2009) also focuses on the company as a whole. This paper shows that for the innovation in R&D, the argument of rapid internationalization in search for global innovations does not apply to the Brazilian EMNCs.

## **7. Conclusion**

The central issue of this article is how to make the subsidiary take charge of the global responsibilities in the development of innovations that are recognized by the MNC? The

results show that the reverse transfer of innovation relies on the strategic orientation of the foreign subsidiary's R&D area; the strong integration (communication) between the parent company and subsidiaries; the entrepreneurial orientation of the corporation, the subsidiary's period of existence and the entry through *greenfield investments*. As previously demonstrated, the implications of the article are focused on the literature regarding the R&D management in foreign subsidiaries of multinationals, and on EMNCs, in particular, Brazilian EMNCs.

The limitations result from the research method used. The survey to the foreign subsidiaries of Brazilian multinationals is of great importance in order to outline an overview on the behavior of foreign subsidiaries. On the other hand, this type of survey has limitations with regard to method, which are reflected in the results presented.

The stratification of the subsidiaries conducted on the study presents a static picture that allows us to make some inferences about the reverse transfer of innovation. However, case studies, though less comprehensive than a survey, have the advantage of longitudinally examining the process of competences in Brazilian multinationals, as well as better identifying the transitions from one type of competence to another.

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