

ABSORPTIVE CAPACITY AND OPEN INNOVATION IN THE BRAZILIAN COSMETICS INDUSTRY*Kleber CELADON¹**Roberto SBRAGIA²*

ABSTRACT

There is currently a growing interest in two concepts and practices related to open innovation and absorptive capacity, in particular with regard to the role played by individuals. This requires a deeper understanding of these concepts because the fundamental basis of any open innovation process is intrinsically linked to the absorptive capacity of an organization, regardless of the degree of openness adopted by innovative firms. This research aimed to understand in depth how these companies deal with different levels of absorptive capacity, since it is a variable that can impact open innovation processes. The cosmetic industry was chosen for its relevance in the Brazilian economic context, and also because it is deeply involved with innovation due to its characteristics of launching new products at every season of the year.. Also, the industry has been little explored by researchers. The findings indicate that the Brazilian market leading companies have a greater tendency to seek for external knowledge but also make use of knowledge from internal R&D, while others focused more on the internally produced knowledge. Assimilation is easiest in companies that invest in people's training or in those that select people with better abilities and qualification, which are large companies. The more open practices are, the more efforts are required, indicating greater complexity in management, and higher level of demand for absorption capacity. It has been confirmed a significant relationship between the concepts (i.e. greater intensity of open innovation suggest a greater commitment for absorptive capacity). More open companies have shown higher levels of absorption capacity, where the knowledge acquired externally are usually assimilated and related to existing knowledge.

KEYWORDS: *Absorptive Capacity, Cosmetics Industry, Open Innovation.*

JEL CLASSIFICATION: *O3.*

1. INTRODUCTION

The input and output of knowledge are part of the innovation process, and involve practices that encourage employee participation in finding opportunities through multiple channels on the market (West and Gallagher 2006). Other studies (Polanyi, 1958; Cohen and Levinthal, 1990; Nonaka, 1995; Howells, 1996; Chesbrough, 2003b; Acha, 2006; Celadon, 2007; Easterby-Smith and Prieto, 2008; Celadon, 2013), also emphasize that innovative processes cannot be limited to local or internal knowledge, but should focus mainly on professionals who can maximize the effectiveness of innovation, as well as finding alternative sources, such as new markets or spillovers. This phenomenon can be seen in the Brazilian cosmetics industry, where there is a constant search for specific expertise (i.e. experts in fragrances) which, in many cases, is

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available only in other countries. In addition, emerging markets such as Brazil, require more in-depth studies that take into account changes in the socio-economic conjuncture. In a more open innovation context, there is a more complex interaction and integration of knowledge, demonstrating the relevance of another concept, the absorptive capacity, which has been explained as a process of learning in organizations and therefore seen as a critical procedure for a better understanding of the competitiveness of organizations. The integration also depends on the attitudes of the actors involved in the learning process, and varies in scope (the greater, the more difficult to be imitated by competitors), and may be more or less flexible with regard to the organization's ability to build innovative initiatives existing (Grant, 1996a; Huang and Newell, 2003).

Open innovation (OI) is directly related to Absorptive Capacity (AC). AC was defined by Cohen and Levinthal (1989) as the ability to learn from external sources, through the identification, assimilation and exploitation of knowledge. The authors also claim that AC is a by-product of R&D efforts, which led to a second definition, giving more emphasis to cognitive aspects, and recognizing it as an ability to assimilate and commercially apply knowledge gained from external sources. They also claim that the results are not only obtained from R&D activities, but come from different bases of knowledge and learning experiences, shared language, functional interfaces, problem-solving, and existing mental models.

2. RESEARCH OBJECTIVE AND MAIN QUESTION

In previous studies the concepts of OI and Knowledge Integration have been compared (Celadon, 2013) demonstrating a high level of complementarity between them, as well as some peculiarities of the relationship between OI and AC. This article is based on these previous studies, and it is engaged in the analysis of OI and the AC, carrying out a cross comparison between nine companies in the Brazilian cosmetics industry.

Thus, for the purposes of this study, the following propositions can be considered as plausible:

1- Absorption capacity is an essential dimension for innovation and competitiveness, and it is responsible for obtaining (identification, assimilation) and optimizing (exploration) knowledge from various sources, internal and external. Since the cosmetics industry shows a high level of integration and exchange of knowledge on innovative practices, the absorption capacity appears to be extremely important to achieving more significant levels of collaboration for innovation.

2- It is expected that open innovation influences absorption capacity (and vice versa) because the effective use of knowledge acquired from external (and internal) sources, probably is influenced by culture (language, interfaces, mental models, learning) and innovation levels, which implies new challenges for business management.

These propositions suggest the following research question: What are the differences between the absorption capacity approaches, and how are they related to the various open innovation practices?

3. LITERATURE REVIEW

The AC concept has been incorporated into the debate on dynamic capabilities (Zollo and Winter, 2002; Helfat, 2006; Teece, 2007), which originated from the evolutionary theory of firms (Nelson and Winter, 1982). It mainly focuses on changes in the business environment and the ability of companies to respond to these changes, while trying to overcome possible problems that might result in the "competency trap", well known in the literature. Dynamic capabilities can be beneficial in turbulent economies (Teece, 2007), typical of developing countries like Brazil. The existing concepts describe AC as an independent variable and innovation as a dependent variable. In addition, studies show that the AC is deeply rooted in innovation processes.

Further research (Todorova and Durisin, 2007) suggest an AC model that goes beyond the original concept of Cohen & Levinthal, and even the theoretical developments that had already been made by Zahra & George (2002), stressing the importance of the mechanisms of social integration. This new model is based on three main arguments: (i) AC efficiency; (ii) contingent factors that can positively or negatively influence AC; (iii) dynamic aspects of the phenomenon, obtained from feedback channels. This model highlights the importance of power relations as a moderator in the capture and exploitation of knowledge, since the differences in power between the various actors can influence the AC and related processes. These differences may occur within the organization or between consumers and other stakeholders (Todorova and Durisin, 2007).

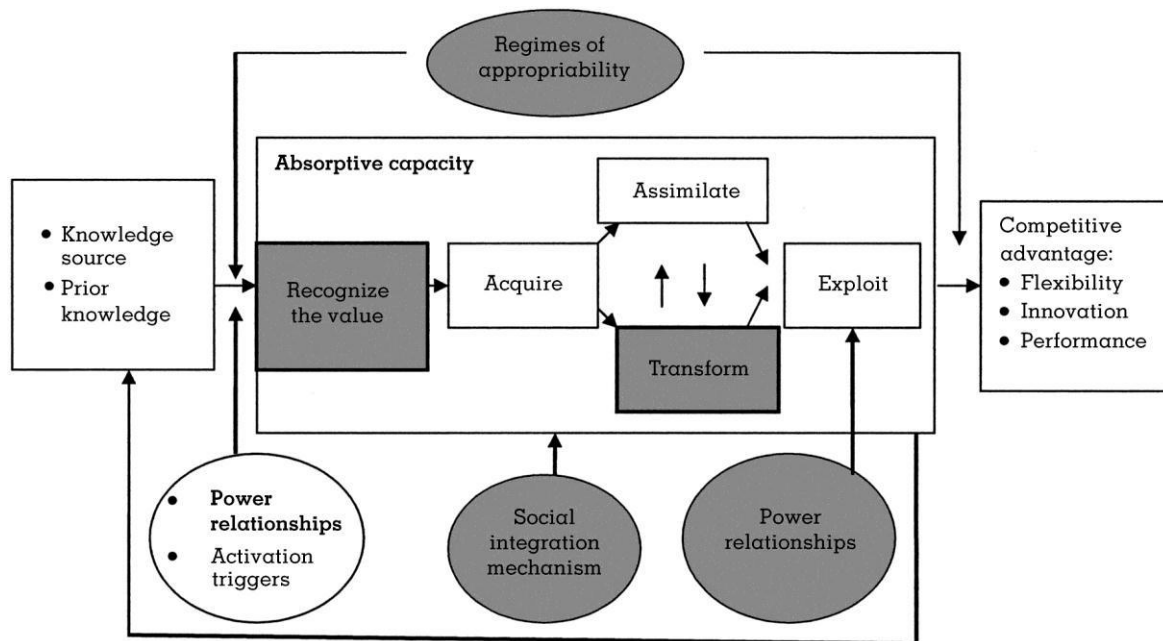


Figure 1. A refined model of Absorptive Capacity

Source: (Todorova and Durisin, 2007, p.776)

Different AC approaches can be summarized in four areas: 1) Value recognition; 2) Assimilation; 3) Marketing or application; 4) Exploration. These dimensions were applied in this study, and contrasted with the responses of semi-structured interviews from the fieldwork. By applying AC, companies must be able to recognize knowledge that is available externally, which can be assimilated and applied commercially. This recognition capability, and even a desire to innovate, are closely related to AC, and can be developed to improve business conditions, until they reach a certain level of stability (not stagnation though). This stability may require certain dynamism and changes to existing management practices, if innovation is in fact desired. In this context, some related management tools, such as leadership styles, are among the crucial issues to bring about changes for innovation. In addition, informal mechanisms such as trust can create opportunities for innovation, and are often key tools that improve communication between employees and the sharing of knowledge (Kogut and Zander, 1992), thus affecting AC.

A successful innovation also requires the management of tensions in order to control flexibility (Dougherty, 1992). It is known that flexibility allows for creativity, training and practical changes, which are the foundations of innovation. In contrast, controlling mechanisms are vital to establish focus and to achieve the desired goals of the company, taking into account budgets and strategic plan of these organizations. These dimensions of innovation can be seen as two plates of a scale, difficult to be balanced, and that can produce different results according to their positions.

Chesbrough (2003a, p.20) says that OI is a new paradigm which assumes that firms can and should use external and internal ideas, using these pathways to hit the market so that companies can get more advanced technologically. OI combines internal and external ideas into architectures and systems whose requirements are defined by a business model, that is, how value is created and captured by companies, which can be done in "three different ways: by incorporating the technology into their current business, through technology licensing to other companies, or by launching new ventures that exploit technology in new areas of business" (Chesbrough, 2003a, p.64).

A few years later, (Chesbrough, 2006a) presented another definition, stating that OI intentionally encourages the inputs and outputs of knowledge to accelerate innovation and to expand activities in new markets. This means that companies must apply more strongly the ideas and external technologies in their own business, leaving their own ideas unused to be utilized by other companies, which requires opening its business model as to allow these ideas and technologies to flow both outside-in, and inside-out. It has been noticed that the main differences between Chesbrough definitions are linked to the words "speed" and "expand." The first definition states, more broadly, the usefulness of exchanging ideas for the benefit of technology, while the second shows the cause and intent of this exchange, that is, the acceleration of innovation and the expansion of markets respectively.

Other authors (West and Gallagher, 2006) claim that OI is both a set of practices to profit from innovation, and a cognitive model to create, interpret and investigate such practices. It has been stated that OI encourages exploration of a wide range of internal and external sources, seeking opportunities for innovation, with the certainty that this operation integrates capabilities and firm resources, widely exploiting these opportunities through multiple channels. Another contribution (Leadbeater, 2007) divides OI into two parts: OI IN is the basic model where ideas from different sources flowing into companies (crowdsourcing), and OI OUT where a group of people or a company, create an interface or a platform with some tools that can be used to add their ideas and contributions.

Some authors also divided OI into three processes: the inside out, the outside in and the coupled process (Gassmann and Enkel, 2004; Gassmann, 2006), stating that OI goes beyond the buying and selling of Intellectual Property (IP) as some people may assume. In the same line of ideas, Harryson (2000,p.5) suggested that the process of innovation "can no longer be limited to local or internal know-how, but needs to focus more on know-who (know who)." This author states that a greater amount of more skilled workers found a need to seek the "right person" to maximize the effectiveness of innovation processes. In addition, specific aspects of innovation, such as uncertainty, risk, and low predictability of results, require new forms of innovation management (Dosi, 1988; Dodgson and Gann, 2008), particularly in today's economic environment that is marked by rapid changes.

Further explanation about OI (Chesbrough 2003a; Chesbrough 2003b; Chesbrough 2006a; Chesbrough 2006c; Chesbrough and Appleyard 2007) states that the key points are not exclusively related to people or "know who", but are associated with searching alternative sources for innovation, either by spillovers or other markets. They argue that the closed paradigm collapsed in high-tech industries, such as photocopiers, computers, disk drives, semiconductor, semiconductor equipment, communications equipment, pharmaceuticals and biotechnology (Chesbrough and Crowther, 2006). The main argument behind this idea is that some factors of this erosion, such as the increasing mobility of highly skilled and experienced workers (for example, the increase in the number of colleges and people with postgraduate degrees), as well growth of venture capital, led to the creation of a highly competitive environment.

In short, although these ideas related to OI are not new, it must be recognized that there are forces in place that are transforming the industrial scenario (Herstad, Bloch et al., 2008) and that "the OI phenomenon has become increasingly important, both for the practice as for theory, particularly in recent years "(Gassmann and Enkel 2004, p.1). It has been claimed that "the

organization of innovative activities (technological and non-technological) that go beyond borders, clearly tends to increase, showing more balance between internal sources and external innovation" (OECD 2008). In addition, as the context becomes increasingly competitive, companies will be challenged to create differentiated products and new markets for sustainable competitive advantages (Clark and Wheelwright 1993).

4. RESEARCH METHODOLOGY - THE CASE STUDY

This study was conducted in the Brazilian cosmetic industry. The focus of this research is on AC of the companies studied, relating this concept with OI practices carried out by these companies, and exploring the interaction among the actors of this process. Thus, a qualitative study was employed, given the great importance of the context. Multiple case studies allow for the replication of the answers obtained, and also for the description of circumstances where they occurred (Yin, 1994). One of the companies was used as a pilot-case, leading to a refinement of data collection instruments, such as semi-structured interviews, scheduling, and other techniques. In addition, the pilot-case was held in the same socioeconomic environment where the research was carried out, in an attempt to harmonize the answers, minimizing possible variations from the environment.

Choosing the cosmetics industry has enabled a validation of this research at later stages, since the design of this study uses a replication approach, that is, each individual case is part of a comprehensive study, where convergent evidence is considered according to the facts and conclusions of each case; each conclusion, therefore, is regarded as information that requires replication of other individual cases (Yin, 2009). Moreover, the cosmetics industry choice is based on the fact that research in this industry is only incipient. People were observed on the spot, and secondary data were also evaluated, in addition to semi-structured interviews (primary data).

A preliminary questionnaire was used (Likert scale) and applied for each company studied before the application of semi-structured interviews. This was created for a previous analysis on the different degrees of openness at each case-firm, namely, "more open", "hybrid" and "more closed", according to the amount and intensity of use of the different OI dimensions, based on the relevant literature.

The questionnaire (phase 1), based on two concepts, open innovation and integration of knowledge, was answered by one person at each company, usually the director of technology/innovation, or the CEO (large companies), and directors, managers or owners at SMEs. The basis of this approach lies in the fact that the study proposes a comparison between companies from different levels of openness. Although this research did not claim to generalize its results, a varied sampling was chosen to enrich the study. The second and most important data collection (phase 2), that is, the application of semi-structured interviews, provided an analysis for the comparison of data (phase 1 with phase 2), searching for possible discrepancies or corroboration.

5. RESULTS

Data from a preliminary questionnaire were compared with data from interviews, and led to the following conclusions: Companies NA and RA are "more open" whereas BU, RA, LC and CA are "hybrid", and AL, HN and BN are "more closed".

Figures presented in Table 2 are the result of a scoring criterion applied to each company studied and from semi-structured interviews (Celadon 2013, p.244-251). The maximum possible value, that is, a company who supposedly practiced all OI modalities, would have reached 44 points (in reality, the highest value reached in the study was 38, at NA, as showed below).

Table 1. Firms divided by degrees of openness (phase 1)

	More Open			Hybrid			More Closed		
Firm	NA	BT	BU	RA	LC	CA	AL	HN	BN
Size	Large	Large	Medium	Large	Small	Small	Medium	Small	Medium
	São Paulo	Curitiba	Curitiba	Curitiba	Curitiba	Curitiba	Curitiba	Manaus	Curitiba

Source: primary data collected from questionnaires

Table 2. Total practices related to Open Innovation (phase 2)

Open Innovation Related Practices	38	33	20	31	12	15	7	6	9
Firms	NA	BT	BU	RA	LC	CA	AL	HN	BN
Degrees of Openness	More Open			Hybrid			More Closed		

Source: fieldwork

It was found that only large companies use strategies for AC, and that SMEs still rely on less formal strategies. The common knowledge base is usually made up of professionals who have the same kind of graduation or specialization, particularly in the areas of pharmacy, biology or chemistry, which facilitates AC in the sector.

The interdisciplinary collaboration also appeared more often in the large companies studied, especially when it comes to international collaboration. SMEs concentrated knowledge in a few people, and usually the owners have a great decision-making power in almost all matters. Thus, decision-making is often linked to the personal nature of these owners.

Brazilian educational levels are below the current demands imposed by economic development, causing a shortage of skilled labour, especially at the technical level. As a result, companies need to invest heavily in training and capacity building in order to transpose the labour limitations, problems that are closely linked to AC of these companies.

In Brazil there are not many suppliers of chemical products that are used in cosmetics, and the existing ones are usually multinational companies (i.e. Givaudan). This imposes a very peculiar feature for the sector, since competitors are required to use the same supplier. Thus, vertical collaboration is part of the modus operandi of companies in this sector, and trust becomes a major issue. Consequently, the external knowledge integration requires special skills of the companies with respect to AC. Vertical collaboration also occurs, but is more present in the actions of large companies that rely on the support of its own lawyers and legal staff on issues related to intellectual property for example.

NA created a department specially dedicated to academic demands, aimed to interactions with universities and research institutes. Large companies such as BT and RA for example, tend to place greater importance on the international market and its trends, while SMEs are more concerned with quality and other more traditional management tools and programs.

Companies combine expertise in specific ways. The largest source of external knowledge at BU is from a group of therapists scattered throughout Brazil. In the case of LC, originated from a large company, a typical case of spin-off can be seen, as this firm has become the main supplier of a company from which LC emerged and has established a "symbiotic" process between experts of the two companies. In recent years, LC has made efforts to break free from this old relationship, and shows already more autonomy in the marketplace.

CA focuses on products that are made of organic and traceable raw materials, resulting in very

special Brazilian cosmetics. It is a strategy to target niche markets, also used (in a different way) by AL and HN. The company BN focuses on the manufacturing of hair colouring products and has competed on equal footing with larger companies in the industry such as L'Oreal, focusing on marketing and advertising campaigns that value different ethnic groups.

Table 3 shows the relationship between the two concepts, OI and AC, based on relevant literature review, as well as results obtained from the interviews and data collection.

Table 3. The relationship between Open Innovation and Absorptive Capacity

TOPIC	Open Innovation Versus Absorptive Capacity
1	Open Innovation proposes the exploitation of existing knowledge and the globally available knowledge, actions clearly associated with the "ability to learn from external sources, through the identification, assimilation and exploitation of knowledge", that is, Absorptive Capacity.
Fieldwork results	The two leading companies have shown a greater tendency to seek external knowledge but also use knowledge from internal R&D, while the other focused mainly on internal knowledge. The more open practices demanded more efforts to identify, assimilation and exploitation of knowledge indicating a higher level of absorption capacity.
2	Combine knowledge is the prerogative of openinnovation, but is also implicit in absorptive capacity.
Fieldwork results	SMEs combined expertise internally, taking advantage of suggestions from customers and suppliers, while large companies have combined external and internal knowledge, (closest to open innovation concept), explaining changes in organizational culture in this regard.
3	When decisions are guided by the market, management has to fit accordingly providing changes for this to occur, which can bring great challenges for managers. Change involves dynamic capacity (absorption).
Fieldwork results	Most companies make decisions based on international and domestic cosmetics market. With the rapid scene changes, companies need to comply with these two dimensions, that is, more open actions, and higher level of absorption of ideas, particularly in large companies (they monitor the market closely - business intelligence, etc.).
4	Open innovation suggests that tacit knowledge supports innovative activities, and it is certainly an integral part of absorption capacity, although difficult to measure, but unquestionably present in practical work.
Fieldwork results	Tacit knowledge is actually seen as a helper on general knowledge of integration processes. Despite being very complex and difficult to measure, there is concrete evidence of the relationship between tacit knowledge and the absorptive capacity (for example, mental models and troubleshooting)
5	Personal ties are determined by technical systems, such as relationships with suppliers, customers and stakeholders. This influences absorptive capacity, because it is based on the affinity of knowledge, that is, the same basis of specific knowledge
Fieldwork results	Most companies in this study have established ties of like-mindedness, and to some extent dependence on suppliers and other industry professionals, promoting absorptive capacity in cases of more opened (and more closed) innovation.
6	Relationships, both individual and as a network, can have high or low levels of intensity related to absorptive capacity. These relationships are the foundation of sharing and integrating knowledge.

Fieldwork results	SMEs have shown a tendency to integrate knowledge through individual networks, while large companies turn up more to networks of companies.
7	Dynamic capabilities are needed for companies to deal with ad hoc structures. Therefore, the relationship between OI and AC will vary according to the intensity of actions of one and / or another, implemented by companies.
Fieldwork results	The companies studied shown to be quite conservative in this sense because they very rarely make use of ad-hoc structures (urgent cases only). The term "dynamic capabilities" is not well known by respondents in general.
8	Companies tend to move from informality to formality over the years. This causes the formation of systems to capture ideas (social knowledge) through interfaces with users, consumers and the community.
Fieldwork results	Three companies that still use informal processes are already developing formal systems. On the one hand this might get firms to a professional standard but, on the other hand, it implies in a reduction in terms of tacit knowledge transfer (eg, in conversations and meetings between biotechnology experts).
9	The absorptive capacity can also vary according to the strategy chosen by the company related to vertical versus horizontal integration, leading to significant differences in knowledge sharing.
Fieldwork results	Large companies prefer to use vertical integration, while SMEs turn to horizontal integration. Vertical integration requires more elaborate action with respect to absorptive capacity because the horizontal integration occurs generally within the same organizational culture and the same knowledge base.
10	Culture is considered a foundation of the contributions system where people can share their ideas.
Fieldwork results	A culture of innovation is encouraged in different ways in each company studied. The large ones created platforms of interface with external audiences and programs, while in SMEs contributions made by the owner prevail, based on his personal experiences.
11	The relationship types (formal and informal) may determine different ways to react to internal and external contingencies. This ability also contributes to sustaining the competitive advantage of companies.
Fieldwork results	Companies tend to react strongly to external contingencies such as changes in economic conditions, new taxes and emergence of new technologies. Expertise related to contingencies makes the company more agile and provides certain competitive advantage.
12	Suppliers, researchers and other participants contribute to the process of innovation, and users who offer ideas based on their difficulties and suggestions.
Fieldwork results	In the companies studied, few ideas arise from users, but suggestions are taken from suppliers and competitors, especially large companies from abroad (USA, Europe and Asia).
13	The relationship between experts requires a considerable level of reliability to ensure the rights of intellectual and industrial property.
Fieldwork results	The relationship between cosmetic industry experts requires a high level of confidence. Often, the same expert is a consultant to competitors but, according to the interviews, are highly reliable people.
14	Innovation goes beyond the acquisition of machinery. It requires the creation of new teams that effectively contribute in the learning process.
Fieldwork results	Three companies are investing in training of high performance teams seeking greater agility in the absorption of external and internal knowledge.
15	The larger and more complex the mix of internal and external strategies for R&D, the harder it is for competitors to copy.

Fieldwork results	Companies are quite conservative with respect to their research methods, but are trying to broaden the scope of its products and services, and even the business model in some cases.
16	Companies must be sufficiently skilled and flexible to build innovative ideas through technological scanning and absorptive capacity.
Fieldwork results	Large companies have got management systems to the realization of scanning technology. Specific actions contribute to the apprenticeship system, resulting in greater flexibility. SMEs have more limitations in this regard.

Source: adapted from Celadon 2013, p.254

6. CONCLUSIONS

This study aimed to address the growing interest in two concepts and practices of open innovation and absorptive capacity, by comparing and analysing different degrees of OI in relation to AC, in nine Brazilian companies in the cosmetics industry. The study method was based on case-study and data were collected mainly through on-site observations, questionnaires and semi-structured interviews.

As a result, it can be said that the two market leaders showed a greater tendency to seek for external knowledge, but also used knowledge from internal R&D, while the others focused predominantly on internal knowledge. The interdisciplinary and international collaboration are also examples of mechanisms that increase the efficiency of AC (Zahra and George 2002), and large case-firms demonstrated higher efficiency in this sense and higher intensity of international collaboration. Assimilation was naturally easier in companies that invest more in training, or that select more qualified people, also more usually found in large companies. Also, the more open practices are demanded, more efforts are needed in order to identify, assimilate, implement and operate knowledge, indicating a greater complexity in management practices, in addition to a higher level of demand for absorptive capacity. Firms showed positive results for innovation through coupling internal and external knowledge (Gassmann and Enkel 2004), independently of its size, which determines more efficacy of OI.

SMEs combined most expertise internally, taking advantage of suggestions from customers and suppliers, while large companies have combined external and internal knowledge, these latter actions being closer to the concept of OI. SMEs tended to assume a follower's posture, that is, observing and following leading companies and market trends. Assimilation was more difficult and less horizontal in comparison to large companies, with the exception of a small company that focuses on specific knowledge for market niche (organic cosmetics). SMEs have shown a tendency to integrate knowledge through individual networks, while large firms are turning more to networks of companies. It was also noted that the operation of internal and external sources is in accordance to the reality of each firm (size, market position, integration with multi-channel networks), confirming previous similar studies (West and Gallagher 2006).

Most companies make decisions based on international and domestic cosmetics market, according to each company governance style and consequently with its relations of power, influencing their AC practices (Todorova and Durisin 2007). With the rapid changes of scenario, companies need to comply with the most open actions, and with a higher level of absorption of ideas, particularly in large companies that monitor market more closely, which are important contingent factors as referred in the literature (Zahra and George 2002). Three companies that still use informal processes are developing formal systems to control information, which are expected to contribute to AC. On the one hand, it makes companies more professional but, on the other, it implies a reduction in tacit knowledge transfer (for example, reducing conversations and personal meetings between biotechnology experts). It was noted, nevertheless, that the increased use of social media appears to fill this gap with more formal models.

Large companies prefer to use vertical integration, while SMEs turn to horizontal integration. Vertical integration requires more elaborate action with respect to AC, such as stress management, for example, which is very much present in these companies, in accordance to previous studies (Dougherty 1992). In the case of horizontal integration, it usually takes place within a single organizational culture and over the same knowledge base, attenuation internal tensions. These organizations tend to react strongly to external contingencies such as changes in economic conjuncture, new taxes and emergence of new technologies. The expertise related to dealing with contingencies makes the company more agile and provides certain competitive advantage, which is a known characteristic of most Brazilian firms.

A culture of innovation influences AC, and it is encouraged in different ways in each company studied. The large ones created platforms for interface with the general public and for the incorporation of technology programs, licensing. They put great emphasis on product launches (Chesbrough 2003a), while in SMEs prevail contributions made by the owner, based on his/her personal experiences. Few ideas arise from users, but some suggestions are taken from suppliers and competitors, especially from large companies abroad (USA, Europe and Asia). The relationship between cosmetic industry experts requires a high level of confidence. Often, the same expert is a consultant to the competitor firm but, according to the interviews, experts in the field are highly reliable people. In this case, it is clear the importance of "know who" as suggested by the literature (Dosi 1988; Dodgson and Gann 2008).

Companies are quite conservative with respect to their research methods, but are trying to broaden the scope of its products and services, and even their business model in some cases. Large ones have management systems for the realization of scanning technology. Specific actions contribute to the apprenticeship system, resulting in greater flexibility. SMEs have more limitations in this regard. Thus, AC efficiency is directly related to these actions, since each has its own dynamism and responds to contingent factors of each situation (Zahra and George 2002).

This study contributed to the expansion of both concepts chosen as the theoretical basis of this study, OI and AC, exploring some particularities of the relationship between them. It can be concluded, based on these results, that both concepts may be further amplified and correlated in future studies.

The analysis and interpretation of results confirmed the existence of a significant relationship between the two concepts. Thus, a higher intensity of practices related to OI suggests a greater commitment to develop AC of companies. The more open companies have shown higher levels of AC, where the knowledge acquired externally are usually assimilated and related to existing within these companies.

This research has focused on a set of cosmetic companies, the vast majority in southern Brazil. This has to be taken into consideration in order to avoid generalizations that may not reflect the truth of other sites and companies. Cosmetic products have characteristics which are totally different from other sectors such as high-tech for example. For this reason, the results of this study should not be replicated in other similar industries indiscriminately. Most of the research done previously was concentrated in high-tech companies in other sectors, mainly focusing on information technology or biotechnology. Thus, the contribution given by this research may offer new possibilities in this area for its unique characteristics, that is, the study of a medium-technology industry in a developing country.

Future studies could improve the understanding of the interrelationship of these concepts in the industry as well as its consequences for innovation. The relationship between these concepts was confirmed as interdependent, and does not occur without a strategic planning, intentional investment strategies (economic and cultural). Although firms tend to invest on internal social cohesion strengthening AC, opening up access to diversified sources exposes organizational members to new ideas and approaches that accelerate innovation.

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