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INCORPORATING SUSTAINABILITY IN THE NEW PRODUCT DEVELOPMENT PROCESS: AN ANALYSIS BASED ON THE RESOURCE-BASED VIEW

INCORPORANDO SUSTENTABILIDADE NO PROCESSO DE DESENVOLVIMENTO DE NOVOS PRODUTOS: UMA ANÁLISE BASEADA NA RBV

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ABSTRACT

This article aims to analyze how the company's resources related to the New Product Development (NPD) process are arranged when sustainability is present in the corporate strategy. The relationships between resources and capabilities present in the technology and product funnels are analyzed, followed by a qualitative approach. The case analyzed is a market leader and pioneer company in Brazil with a sustainable approach in its processes and strategy. Different sources of data were accessed. 26 semi-structured interviews were made with different areas involved in NPD (technology and product development, planning, purchasing, engineering, process management, biodiversity management, marketing and sustainability). The case study sought to reinforce validity and reliability through multiple sources of information and access to the research documents for the interviewees. The analysis was based on the funnels of technology and product. The results suggest that when sustainability is present in the corporate strategy, the NPD process combines the existing resources with new ones, incorporating them into the guidelines concerning sustainability requirements, bringing innovation into the company's practice. New actors also are present in the process and consequently the complexity is increased.

Keywords: resource-based view, new product development, sustainability, case study.

RESUMO

Este artigo tem como objetivo analisar como os recursos da empresa relacionados com o processo de desenvolvimento de novos produtos (DNP) são organizados quando a sustentabilidade está presente na estratégia corporativa. As relações entre recursos e capacidades presentes nos chamados funis de tecnologias e de produtos são analisadas, seguidas de uma abordagem qualitativa. O caso analisado é uma empresa líder e pioneira no Brasil que incorpora a sustentabilidade em seus processos e estratégia. Diferentes fontes de dados foram acessadas. No total, 26 entrevistas semiestruturadas ocorreram nas diferentes áreas envolvidas no DNP (tecnologia e desenvolvimento de produtos, planejamento, compras, engenharia, gestão de processos, gestão da biodiversidade, de marketing e de sustentabilidade). O estudo de caso buscou reforçar a validade e a confiabilidade através da utilização de múltiplas fontes de informação e acesso aos documentos do estudo pelos entrevistados. As análises foram baseadas nos funis de

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tecnologia e de produtos. Os resultados sugerem que quando a sustentabilidade está presente na estratégia corporativa, o processo DNP combina os recursos existentes com novos recursos presentes e os incorpora às diretrizes relacionadas à sustentabilidade em suas necessidades, trazendo inovação na prática cotidiana da empresa. Novos atores também estão presentes no processo e, conseqüentemente, a complexidade é aumentada.

Palavras-chave: visão baseada em recursos, desenvolvimento de novos produtos, sustentabilidade, estudo de caso.

INTRODUCTION

New Product Development (NPD) is recognized as one of the chief processes of innovation, which accounts for a vast array of literature on the theme (Krishnan and Ulrich, 2001). NPD constitutes a key factor in competitiveness for many companies (Brown and Eisenhardt, 1995; Jayaram and Narasimhan, 2007). At the same time, sustainability is a current demand placed on all organizations, with an increasing pressure from all stakeholders.

Nevertheless, there are few studies that provide a broader perspective associating NPD and sustainability, especially in an approach that considers more dynamic conditions of the competitive environment.

In this context, NPD and sustainability may develop a bilateral relationship in which sustainability might be also a driving force that generates innovation (Nidumolu *et al.*, 2009). We consider the innovation process and sustainability as potential sources of competitive advantage (Angell and Klassen, 1999; Linton *et al.*, 2007).

On the other hand, the incorporation of the perspective of sustainability into NPD leads to possible changes in the company's resources. Usually NPD is evaluated by cost, quality and time related to the whole process or by market performance.

For example, Pujari (2006) and Pujari *et al.* (2003) analyzed the market performance of NDP combined with environmental concerns. Additionally, Baumann *et al.* (2002) proposed a model that integrates internal and external perspectives in the sustainable NPD, claiming that both are important for the final results.

At the same time, studies exploring changes associated to the incorporation of sustainable principles in the NPD process are still rare. Regionally, Jabbour *et al.* (2012) suggested the need for a conceptual model for Brazilian companies with a focus on a proactive environmental management. Qualitative and more detailed studies with a deep analysis of the changes in NPD when sustainability is a corporate concern are still scarce in the literature. Thus, we may address the following questions: When sustainability is present in the corporate strategy, how are the aspects related to sustainability present in the NPD processes? Additionally, how are the resources and capabilities of NPD influenced when sustainability is a concern? One po-

tential contribution of this study is to integrate the decisions in the NPD process that are related to sustainability. The second is to present, based on an applied approach, how the processes related to innovation and NPD are influenced by sustainability concerns. Thus, this study aims to analyze how the resources related to NPD are (re)arranged when the corporate strategy incorporates sustainability principles.

LITERATURE REVIEW

NEW PRODUCT DEVELOPMENT (NPD)

The usual form of innovation for the value creation process takes place through NPD (Brown and Eisenhardt, 1995). NPD occurs based on the integration of dispersed knowledge of different nature, such as scientific, technological and market knowledge, resulting in recognizably differentiated products. Studies about the performance of industries consistently indicate NPD as a source of higher performance, but there is still little basis regarding how to direct efforts towards its improvement (Wheelwright and Clark, 1992).

Several authors also present the perspective that NPD is a strong natural driver for continuous change, not only via new products, but also at the organizational level, having organizational changes as potential benefits (Wheelwright and Clark, 1992; Brown and Eisenhardt, 1995; Danneels, 2002). Thus, a capability to perform NPD may create a competitive advantage (Wheelwright and Clark, 1992; Brown and Eisenhardt, 1995; Holtzman, 2011).

Traditionally, the processes of innovation have been shown in a linear perspective, describing the sub-processes throughout a causal sequence. This is not different in NPD: it starts with investments in scientific research resulting from a scientific discovery, moving towards the availability of technology. After this step, technology may be linked to market discovery or to other development paths. After testing and validation, there is the introduction/launching of the product in the market. This whole process makes sense for the level of pipeline and project management, viewed as a routine or a stage gate process with continuous evaluation (to determine whether the project continues or not). The process has a very important role in supporting NPD, since

the process develops the products and the work related to the products in multifunctional teams.

The funnel format was a concept proposed by Wheelwright and Clark (1992) that aggregates the vision of portfolio management, beyond the usual concepts of pipeline and project management, illustrated in Figure 1. A funnel of projects brings the notion that the input is greater than the output due to the choices made throughout the process, providing a certain mortality rate of projects. These decisions prioritize some projects and accelerate/decelerate projects to meet the strategic business goals.

The portfolio management of projects for new products seeks the balance between risk and reward according to the company's goals related to stability or growth. The company may use several parameters, such as project alignment with the business or corporate strategies (from excellent to poor), the innovative level (from high to low), and the strategic importance to the business (from high to low). In addition, we may rely on other parameters such as the potential competitive advantage sustained (in years), benefits (financial or knowledge-related), the competitive impact of technology (basic, key, advanced, emerging), uncertainty (probability of technical, commercial and general success), and the required investments and their return (Wheelwright and Clark, 1992; Cooper *et al.*, 2001, 2002).

INCORPORATING SUSTAINABILITY TO NEW PRODUCT DEVELOPMENT (NPD)

When innovation is embedded in a sustainability orientation, identifying explicit objectives related to environmental and social improvements becomes something usual. In this context, environmental objectives are integrated with other traditional objectives, such as cost, quality and time-to-market. When sustainability is considered as a high priority, it is included in the company's explicit policies (Triebswetter and Wackerbauer, 2008).

Traditionally, in an NPD process, there is the participation of different functional internal areas such as R&D, marketing, finance, supply and manufacturing. The NPD process requires a group of external stakeholders when sustainability is present. Thus, besides more usual external actors, such as suppliers, customers, scientific community and government that have a key role in the NPD process, in a sustainability-oriented NPD there is an involvement of new actors. Those are groups that are directly or indirectly impacted by the company's outputs, such as NGOs (Polonsky and Ottman, 1998).

Polonsky and Ottman (1998) state that what they call a "green" NPD process is characterized by an extensive communication between the company and its stakeholders and not by a reactive behavior influenced by external actors. As to the

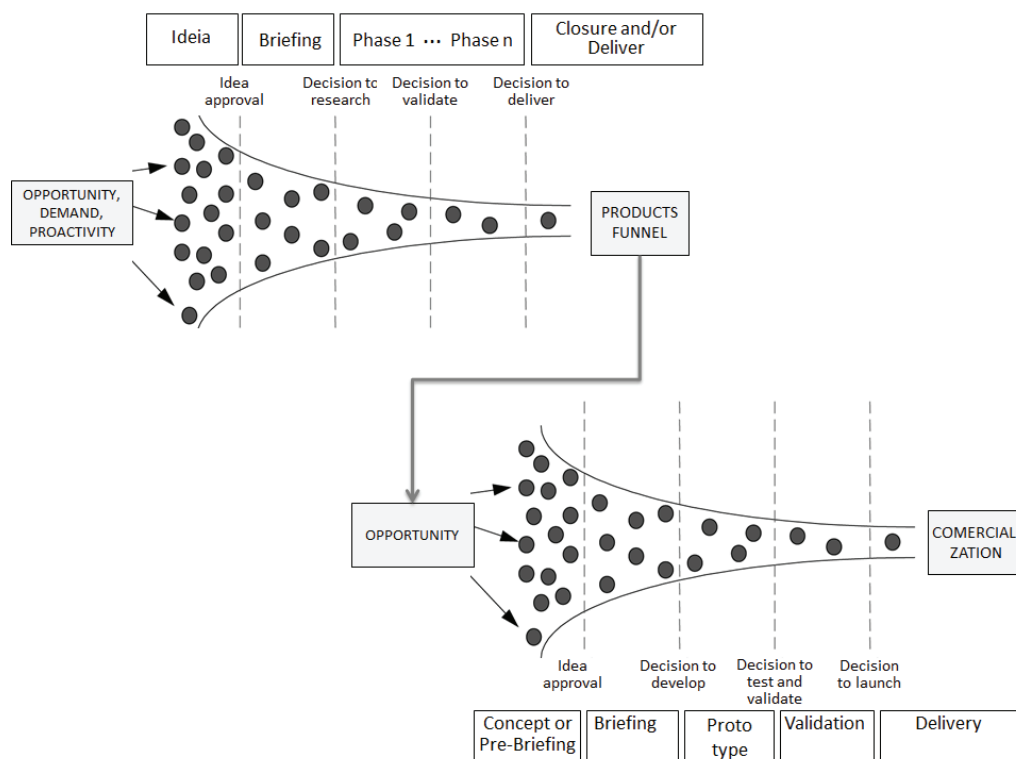


Figure 1. Technology Funnel and Product Funnel.

Source: Adapted from Wheelwright and Clark (1992).

final consumer, the company has the challenge of identifying what creates value in their products from the perspective of sustainability. Trade-offs are present and may create more complexity to the NPD and to the decision-making process (Byggeth and Hochschorner, 2006; Camahan and Thurston, 1998). Thus, NPD within a sustainable orientation involves multiple interactions among internal and external actors and it leads to an increasing complexity (Hart, 1995).

At the same time, this increased complexity creates new opportunities for synergy between sustainability and innovation. Husted and Allen (2007) claim that there is a strong relationship between NPD and social responsibility programs. On the one hand, companies may use social responsibility programs as a way to leverage the NPD process and generate valuable resources and expertise (Brito and Berardi, 2010). On the other hand, companies that continuously innovate may use this same bundle of resources in a wider proposal, such as creating social and environmental corporate strategies (Husted and Allen, 2007).

For the NPD process, it is possible to identify some specific tools, such as ecodesign. Ecodesign is a concept that integrates a multidimensional view of design with environmental concerns. The goal is to create sustainable solutions that satisfy human needs and desires (Karlsson and Luttrupp, 2006). Nevertheless, this proposal should consider the complexity of the NPD process, which involves many internal and external actors that are essential to the whole process. Gobble (2012) points to a gap that is created when companies do not consider these key connections for a sustainable orientation in the innovation process.

NEW PRODUCT DEVELOPMENT (NPD) AS A CAPABILITY

Since the 90s, competences and capabilities have been related to the development of competitive advantage (Prahalad and Hamel, 1990), through the generation of differentiated value perceived by the clients. We claim that NPD is a strategic organizational capability (Eisenhardt and Martin, 2000). This capability encompasses a set of transformation skills organized by a process that begins by responding to a market opportunity and a set of technological proposals. The final objective is to deliver a differentiated product and make it available for commercialization (Krishnan and Ulrich, 2001).

The importance of capabilities is related to the recognition that the competitive advantage of firms arises from their bases of resources, competences and capabilities. Resources may have specific characteristics like being valuable, rare, not imitable and not replaceable (Barney and Clark, 2007). Different authors (Grant, 1991; Amit and Schoemaker, 1993) have treated resources and capabilities separately. Currently, there is an apparent consensus in research that capability is not the same as resources (Flynn *et al.*, 2010). Nevertheless, there is

still a misinterpretation regarding these concepts. Perhaps this is due to the fact that, originally, the word 'resource' was used in a broader sense. Besides this, competences and capabilities are usually used in an indistinct manner.

In this study, in order to clarify the concept of resources in the Resource-Based View (RBV), we divided them into resources, competences and capabilities. Black and Boal (1994) state that a resource network is able to create a competency network and a change in one resource is counterweighed by a change in another resource. Resources also can be further subdivided into fundamental categories, such as assets and skills, tangibles and intangibles.

Therefore, the launch of a new product requires the use of the firm's resources related to the NPD process, including operational and organizational resources, and tangible or intangible ones. In operations, examples of tangible resources are researchers, equipment, and raw materials. At the organizational level, we may mention industrial plants, their equipment and location. Individual expertise can exemplify intangible resources. At the organizational level, the reputation of the brand is another example of an intangible resource.

These resources are used through routines and processes, for the development of a concept, a formula or a packaging. Organizational competences are operationalized based on the operational capabilities. For Wu *et al.* (2010, p. 726), organizational competences are firm-specific, tacit, path-dependent and emerge gradually over time. Our understanding of "operational capabilities" is this, in the words of the authors: "firm-specific sets of skills, processes, and routines, developed within the operations management system, that are regularly used in solving its problems through configuring its operational resources".

The firm's resources are diverse, and their importance arises from how they are employed in the different functional areas, providing different contributions. For management the challenge is to find their best use (Lockett *et al.*, 2009). Resources aggregate value when they are complementary, related or co-specialized (Lockett *et al.*, 2009). In this case, management has the role of understanding the functionality of each resource to guarantee the best combination for a common goal (Danneels, 2002; Lockett *et al.*, 2009).

Operational capabilities are part of the company and reflect behaviors and beliefs accumulated in its trajectory, because they are path-dependent. Therefore, operational capabilities are difficult to imitate (Leonard-Barton, 1992; Amit and Schoemaker, 1993; Swink and Hegarty, 1998; Flynn *et al.*, 2010).

The types of operational capabilities adopted in this study are taken from the studies by Swink and Hegarty (1998) and Flynn *et al.* (2010). They are: *Improvement* and *Innovation*, that include customization, in order to improve something already existent or something new or radically altered; *Responsiveness*, with an operational view of flexibility and an external one related to the time to market that, combined with

Enhancement and *Innovation*, guarantees the use of windows of opportunity; *Integration* and *Co-operation*, with an internal and an external scope; and *Reconfiguration*, which confers the skill of "deliberately creating, extending and modifying" the resource base (Helfat *et al.*, 2007) mainly in response to external factors (Teece *et al.*, 1997). Two other capabilities proposed by the authors are *Learning*, fundamental to the development of any competence or capability; and *Communication*, an essential capability for the establishment of relationships, exchange of knowledge and information flows.

The organizational capability related to NPD (Eisenhardt and Martin, 2000) needs to be continually expanded. Under pressure from competition, the NPD process will achieve success only in the long term (Wheelwright and Clark, 1992). The teams involved in the NPD should possess the skill of matching its processes and routines in order to better accomplish the company's mission (Eisenhardt and Martin, 2000). The NPD process will be more linear and predictable in moderately dynamic markets, with clearly defined limits and competences based on existing knowledge translated into routines. On the other hand, in more dynamic markets, the activities are less linear or predictable, the frontiers are less clear and the competences are based more on new knowledge generated in specific situations. Usually NPD process has simplified routines, but nonetheless sufficiently structured, with rules only to establish frontiers and priorities (Eisenhardt and Martin, 2000).

Flexibility is a fundamental challenge for NPD. An intense systematization of NPD can be counter-productive for the creative process, although many of the NPD activities are composed by routines. It does not seem reasonable "to transform the art of product development into a formal science [...] into a systematic process with the intention of improving performance" (Krishnan and Loch, 2005).

Human resources, as the different actors of the process, play an important role that contributes to the final results (Brown and Eisenhardt, 1995; Verona, 1999). They include senior management, exercising the adequate role of inspirers or orientators and being responsible for the governance of the process; the project leader, having the most strategic and inspiring role of leadership (Verona, 1999); and the project manager, responsible for carrying out the planning of the execution. The cross-functional project team should have the ability to work as a team, to accept the views of others, and to acquire external knowledge.

Technical resources are observed in specific knowledge and assets (Leonard-Barton, 1992; Peng *et al.*, 2008). They may be acquired externally but are accumulated through technological knowledge management. Proprietary processes, equipment and processes protected by patents (or know-how) are resources that become idiosyncratic when related to the learning capability described above (Schroeder *et al.*, 2002).

Market resources follow an external approach. They include the understanding of customers' desires and needs

and the connection with commercial aspects, market segmentation, product and brand differentiation. Not all of them act within NPD, but they are essential efforts to enable new ideas for products.

The management of resources comprehends internal and external integration, cultural aspects and organizational values, which may affect the NPD process. Operations strategy has a fundamental role in the integration of the operational processes into the corporate strategy (Wheelwright, 1984; Demeester *et al.*, 2014; Kim *et al.*, 2014).

Physical resources such as plants, laboratories, equipment and geographical location are key aspects for the NPD process. Institutional resources that include reputation and institutional relationship are fundamental for funding, especially from government agencies (Teece *et al.*, 1997).

Demands of clients or consumers, which in the past were mainly related to product prices and quality, have been extended to the perspective of product life-cycle (Bakker and Nijhof, 2002). The current challenge is to develop products with an explicit focus on environmental improvements with a simultaneous focus on the other product attributes.

Finally, the perception of what is legitimate and responsible may change over time. Therefore, companies have a challenge to develop a capability to perceive, reflect and respond to diverse claims from different stakeholders (Bakker and Nijhof, 2002). In this context, NPD has a broader challenge as a capability. Besides overcoming all the current challenges, NPD needs to incorporate the present concept of sustainability and to identify the future market demands.

Proposed theoretical framework

Based on the literature review, a theoretical framework is proposed. This framework follows the perspective that the company defines its goals (performance objectives), means (resources, competences and capabilities) and paths (strategy) to guarantee the expected performance (Peng *et al.*, 2008). The same applies to the operational level (Flynn *et al.*, 2010), which is aligned to fulfill its role within the corporate strategy (Wheelwright, 1984; Peng *et al.*, 2008).

The concept of capability in the operations strategy approach is based on the role and contribution of operational processes to the corporate strategy, including the link among these levels of strategy (Skinner, 1969; Wheelwright, 1984; Swamidass and Newell, 1987). Thus, it is in line with the definition of capability by Wu *et al.* (2010). The most evident links are the competitive dimensions that are harmonized to meet the performance objectives, and the organizational capabilities that are aligned with these objectives. The effectiveness of the company's strategy hinges on understanding the differences between resources and processes and their adequate use to achieve the performance objectives (Flynn *et al.*, 2010). Furthermore, the framework illustrates the direct influence of

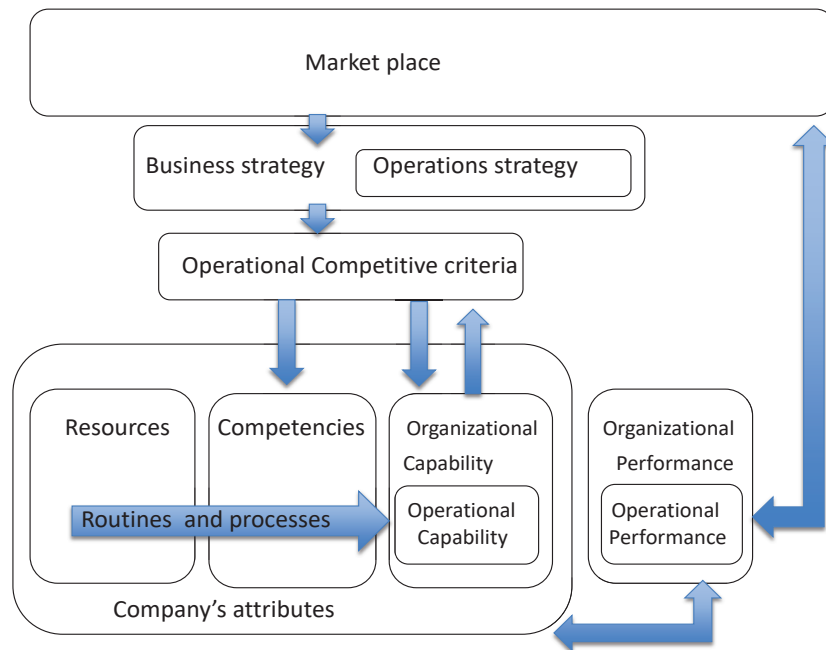


Figure 2. Detailed proposed theoretical framework.

the competitive dimensions on the firm's bundle of resources and capabilities, confirming that the organizational capability contains the operational capabilities related to NPD.

Figure 2 briefly presents the organizational links between the corporate strategy and the NPD process. At the first level, corporate strategy is deployed at the operational level with the inclusion of sustainability in the four traditional competitive dimensions (cost, flexibility, quality and delivery). The inclusion of sustainability will influence the resources, organizational competencies and capabilities related to the technology and product funnels that compose NPD. At the end, the presence of sustainability will influence the NPD performance with new relations between this aspect and the four traditional dimensions (Polonsky and Ottman, 1998). At this point, trade-offs may arise and increase the complexity of the NPD process (Byggeth and Hochschorner, 2006).

METHODOLOGY

This research poses a "how" type of question (Yin, 2009). In this context, there is no possibility of control over the phenomenon under investigation, as well as over the people involved, and there is a focus on contemporary events in the investigation of this phenomenon in depth and in its original context. In view of the significant situations presented, the most recommended method for this research was a qualitative study (Barratt *et al.*, 2011).

The case analyzed, Natura, was chosen because it meets several criteria related to relevance to the focused topic. Natura is a unique case in Brazil and even in emerging

economies. It competes directly with international brands in the Brazilian market, the second largest in cosmetics in the world, and in the whole Latin American market. Natura's revenues have been increasing in the last years and it is a market leader in these markets. The company combines innovation and sustainability in its corporate strategy. Besides this, the company is externally recognized for being innovative in the market, as shown by its position in the rankings and the prizes it has been awarded, as well as for the flow rate of its innovations. As far as sustainability is concerned, Natura is an industrial enterprise that develops products targeted directly at the consumer and has been present in the ISE (the Brazilian index for business sustainability – Índice de Sustentabilidade Empresarial in Portuguese) since its creation. It is worth mentioning that there are few examples, mainly in Brazil and in other emerging economies, of this combination of innovation and sustainability applied to NPD. Most of the organizations still treat these themes separately following a preventive approach, without incorporating sustainability into NPD (Jabbour *et al.*, 2012; Jabbour, 2010). Natura has presented many actions to increase sustainability concerns in the NPD process in recent years, including elimination of tests with animals, reduction of package size and material, use of refills, and use of native plant species cultivated by local communities.

Different sources of data, both with a descriptive and an exploratory character, were accessed in order to enrich the data collection (Choi and Hong, 2002). Twenty-six (26) personal semi-structured interviews, both individual and group interviews, were conducted between October 2011 and November

2012. The interviewees were from different functional areas involved in NPD (technology development, product development including formula and packaging, planning, purchasing, engineering, process management, biodiversity management, marketing and sustainability). All the interviewees were at management level and had worked for at least five years in the company. Other interactions within an informal approach were made to access specific information about facts that have occurred. As one of the researchers worked in Natura, the access was facilitated.

The quality of the case study has four essential conditions: validity of construct, internal validity, external validity and reliability (Yin, 2009). The orientation for validity was the utilization of multiple sources of evidence and key informants at different stages of the study. The chain of evidence was constructed on the basis of a longitudinal approach. The longitudinal view was sought based on the interviews with the groups of senior managers. Through a more storytelling approach, the group of senior managers described the events faced by the company when they sought to create a sustainability focus within the corporate strategy.

The internal validity was accessed through the theoretical schemes and the combination of explanations collected from diverse sources. The external validity was addressed based on the theoretical scheme proposed from the literature review. Finally, the reliability was guaranteed by the protocol of analysis of the sources. The majority of the interviews were conducted with the same protocol and most managers read the analysis done after the interviews (Eisenhardt, 1989).

The analysis was based on the two funnels that compose the NPD process and their capabilities. Based on the technology and product funnels, we analyzed how the capabilities are developed when sustainability is a strategic focus. The data was gathered based on semi-structured interviews: NPD, sustainability, resources and capability. The funnels are the processes that integrate the resources and comprehend the development of capabilities related to NPD. In this study, we analyzed the changes related to sustainability along the processes in these two funnels.

CASE STUDY

This study was focused mainly on the period from the end of the 90s until 2011, when there was the perception that the resources base was being formed over time.

Natura is a 43-year-old Brazilian company, with open capital since 2004, acting in the market for toiletries, fragrances and cosmetic products (CFT), using a direct sales model through 1.4 million independent representatives in Latin America, mainly in Brazil.

Natura has led the CFT market in Brazil since 2007, and its products, which held a 62.1% market penetration in 2011, are found in 100 million Brazilian homes. Its market share in

the target market (fragrances, make-up, skin treatment, sun protection, hair care, deodorants, soap and shaving cream) is 23.5%, representing 14.5% of the total CFT market. It is also the favorite brand among Brazilian consumers, with an index of 47%, more than the double of the second one in the ranking (Natura, 2011). In 2011, the net revenue reached R\$ 5.6 billion, 8.9% greater than in 2010, and the net profit was R\$ 831 million, 11.2% higher than in the previous year. It can be claimed that the company is financially healthy and that its organizational performance has been greater than the market average by observing the share value and the growth of the net revenue, which has always been greater than or equal to that of the target market since 2001. Investment in innovation as a percentage of the net revenue (2.5 – 3.0%) is a corporate commitment and the innovation index (gross revenue generated by products launched in the last 24 months divided by the total gross revenue in the period) in 2011 was equivalent to 64.8%, with 164 products launched.

Regarding environmental aspects, since 2011 the company has reduced its greenhouse gas emissions (GEE) by 5.3%. The accumulated reduction since 2006 is 25.4%, and its declared commitment is to reach 33% in the next two years. The relative water consumption has been reduced by 4.8%, thus maintaining a level of 0.40 liter/unit produced, in accordance with a previously established commitment (Natura, 2011).

NPD IN NATURA

Natura's NPD process has always been systematic, with the participation of the main executives, even though it has undergone an increase in formalization and periods of change of governance and organizational restructuring of those involved. The innovation process is considered as one of the company's key business processes. The Technology Funnel is part of this process, aimed at projects to develop technologies, and the Products Funnel comprehends projects to develop new products to be launched in the market.

Natura has developed different resources in its trajectory, which form the base of its bundle of resources for the whole organization and its operations. Companies differ in terms of the resources portfolio available for developing and implementing a strategy related to sustainability (Bowen and Sharma, 2005). Natura, at the beginning of the development of the Ekos product line, had no clarity regarding which new competences would be necessary. Gradually, they became apparent and, consequently, they were created or acquired in different ways. Nascimento (2002) compared the portfolio management in Natura and in Embraer, a Brazilian aircraft manufacturer. According to the author, the project portfolio in Embraer presented a more centralized approach pursuing a big project with a long-term view. On the other hand, Natura presented a decentralized process with human resources involved in different small projects.

Based on the two funnels, we analyzed the organizational competences, addressing the resources involved in the operational capabilities. Resources were identified based on the interviews and document analysis. The different resources related to NPD and fundamental to the incorporation of sustainability in the corporate strategy which we found are the following: founders' presence and profile; company's culture, reputation, identity and brand image; relationship with the sales channel; capability to raise external financial resources for innovation. It is worth pointing out the company's products pursue a price premium and the recognition of the products' quality by the market. Another aspect is related to Natura's geographic location, which is explored as the Brazilian style in the products. Regarding the internal aspects we may mention the size of the company; technical resources in manufacturing; internal and external relationships; and a set of tools and internal systems that are related to the company's model of open innovation.

THE TECHNOLOGY FUNNEL

In the Technology Funnel processes, the first step called the idea phase allows discussion of possibilities for new technologies or themes for the acquisition of knowledge. Intermediate phases are not predetermined by different types of projects that pass through this pipeline, which is an option that allows for greater flexibility.

There are policies and guidelines that orientate transversal efforts or that even lie within the process. When a project involves biodiversity, especially the Brazilian biodiversity (BDB), Natura has its policy of Sustainable Use of Biodiversity and Traditional Knowledge (USBD) (Natura, 2006), which governs the procedures and requirements that must be fulfilled regarding the research activities, mainly for the choice of the community that will supply the needed vegetal raw materials. The policy sought to conform to the precepts of the Biological Diversity Convention, which was signed by Brazil during ECO-92. For the development of processes, there are guidelines with requirements established internally, like, for example, clean processes for the development of technologies. There is also flexibility in the approval of new parameters or specifications outside the limits established in internal forums.

The flow of information and knowledge of this process has specificities regarding how sustainability has been incorporated into it, leading to the development of new competences. The presence of new sub-processes can be perceived, such as agroforestry technologies. Other more traditional sub-processes require new knowledge and organizational competences, such as the development of raw materials with a focus on renewable sources and biodiversity. Ecodesign is expected to be present in both Funnels, but when addressed in the Technology Funnel, the focus is on the construction of new concepts and technologies to support its application in product development.

These aspects have brought impacts on the operational performance of the NPD process. In general, these changes had a negative impact on traditional dimensions, since they aggregate complexity to the process, new routines and new players. Nevertheless it is possible to identify that the existing levels in product quality were maintained. The other dimensions were analyzed and goals were re-established, because it was realized that it would not be feasible to keep past goals within this new context.

These are the organizational competences which were identified and analyzed, after verifying the associated resources and the presence of operational capabilities: competence in agroforestry technology; competence in the development of raw materials; competence in the development of methodologies that must be divided into types according to their specificity (safety and efficacy, well-being and relationships); and competence in ecodesign. The two first competences were identified in the activities related to the development of local communities.

"[...] the cost of implementation of a passion fruit culture is high [...]. A local farmer makes no more than one minimum wage [...] it was impossible for them to invest in this new culture. Then our supplier along with Natura decided that they were going to make an investment and then cashed [...] in the price of raw materials."

In the Technology Funnel, as part of the NPD capability, there was the need to acquire new competences that, at the first moment, had been internalized from external partners. Together with existing capabilities, it was possible to identify a *Reconfiguration* capability with the continuous incorporation of sustainability principles. Besides bringing new organizational competences, it created new routines to support the Products Funnel in order to meet new competitive dimensions besides cost, quality and flexibility.

"There were several things we were changing throughout the process and there were decisions thus taken in sequence to assure the project release."

The other NPD capabilities identified were *Improvement* and *Innovation*, which include customization, and *Responsiveness*, because Natura needs to adapt internally to the new opportunities and market demands related to sustainable products. This aspect includes the internal processes as well the external ones. We may mention in this case the processes related to the integration with suppliers and local communities.

"One thing that farmers commented [...] is that we have promoted the best agricultural practices [...] so that you have to manage seeking these environmental and social benefits."

THE PRODUCTS FUNNEL

The Products Funnel, as a process, does not have the same characteristics and needs as the Technology Funnel, considering different competences and projects. However, the capabilities are more traditional and established than in the

Technology Funnel. In the initial phase, there is the concept planning. It includes product's value added, value for the consumer, the desired degree of innovation, the macro-business proposal with financial guidelines, and the macro-timetable and risks. As the project advances, these points are deepened and become more detailed.

The capability of *Reconfiguration* is present with the incorporation of the sustainability proposal through new practices, new tools, new ways of doing things like in brands like Ekos and Chronos.

The environmental and social goals for all projects, such as those related to the brand Ekos, are already established by process guidelines defined by the corporate strategy. The established environmental goals are related to the measurements made in the portfolio's products. There are established reduction goals for all the projects defined by their product categories. If a project does not achieve the established goal, it must be referred to the Products Committee in order to get the authorization to continue the development process. In the case of social goals, the brand Ekos follows goals that are related to indicators such as the ones in BIOQLICAR, a program for development of suppliers related to local communities (for a more detailed description, see Carvalho, 2011). Besides this, the access to traditional knowledge from the local community also follows the company's internal policy (identified as USBD). In the formula development for the product, it becomes necessary to deal with ingredients of color and fragrance that cannot be altered because of the risk of change or degradation of the raw material. Besides, this process is concerned with quality – how to analyze and guarantee assured quality of these ingredients.

"[...] the vegetal extract has a color and odor that are very characteristic. [...] but an evaluation was carried out, if essential oils were taken out, the activity would be diminished. [...] as that was produced in the Chronos Jambu line, let's augment the concentration of the active (oils) and diminish what does not matter [...]. To get to that technology we had to [...] map the similar known in the market."

In the packaging development, the critical challenge is to combine the principles of sustainability to the aesthetics and cost target. Besides the technical-functional aspects, there is a concern with the origin of the packaging and also gifts. They sometimes may come from countries where, for example, there are doubts regarding job conditions. In all the sub-processes, the implementation of the ecoconception or ecodesign with expanded scope is essential. The change in the information flows in the Products Funnel within the traditional sub-processes occurs due to the use of vegetal-based raw materials. The crops from plants with different life cycles and which normally take a long time to be obtained due to the harvests establish a premise that the company calls the cycle of nature. This aspect implies planning and negotiations with suppliers for ingredients that are not from the ordinary market. Here the *Communication* capability is identifiable.

"[...] the focus is very important, [...] the one that the other hears. The speech inside the (Technology) Funnel and the one you have inside the industrial (area) are totally different to get to the same place" (NPD manager).

Differently from the capability of *Reconfiguration* and *Communication*, the capabilities of *Improvement* and *Innovation* are present in order to improve or to radically change the products when sustainability goals or constraints are present. "Innovation needs to fail a little, bring ideas that will move on or won't [...] and they will bring other things that will be relevant in the future."

The *Integration* capability is important also for the internal processes and the external ones related to the supply.

"[...] it [the supply] did not depend just on me, it depended on the sazonality, the occurrence of the plants, the concentration of the active oils, on the supplier, on the schedule of the gas supplier, depended on millions of things that escaped from our control (Purchase manager).

Complementarily, organizational competences that were identified and are associated to resources and to operational capabilities were these: competence in marketing; competence in developing formulas; competence in packaging development; competences in supply, planning and logistics.

All these competences precede the NPD capabilities and they present a wide basis in the several functional areas, such as marketing, manufacturing and R&D. These competences present a growing complexity in dealing with sustainability. This increase in complexity refers not only to seeking alignment with the adopted principles, but in particular to the sustainable use of the Brazilian diversity, given that the aspects of nature (harvest or the right time for planting) and work with local communities are premises that must be considered and protected to avoid mutual losses.

In this case, there is a need for sub-processes and competences, such as the management of the relationship with local communities that includes authorization for research and intellectual rights (protection, appropriation and sharing), which in several times are unknown by these external actors. Furthermore, with regard to intellectual rights, the strategy is aligned to the company's principles. For example, even in projects where there would be the possibility of confidentiality of product tests without animals, Natura does not keep them private. Rather, it divulges and encourages their dissemination in the belief that this is the best way to contribute to society.

CONCLUSIONS

The operational capabilities related to NPD observed in the case study are embedded in the competences. This aspect is central for the internalization of changes in the company's

strategy when sustainability is a corporate objective. Sustainability in the case analyzed has developed not only resources and specific competences, but the NPD capability as a whole.

The case suggests that the arrangement and consequent reconfiguration of the company's resources and its capabilities are essential for the incorporation of sustainability principles into the NPD process. The presence of such principles in the corporate strategy has led the company to reorientate its resources, competences and capabilities, modifying existing ones, acquiring new ones related to NPD and combining them. New guidelines are also incorporated into requirements, bringing innovation and sustainability into the company's processes.

Other aspects related to the incorporation of the sustainability principles into the NPD process were also identified. The sustainability strategy adopted by Natura with an ecobranding approach depended directly on the NPD capability in order to be implemented. In this case, developed products follow the sustainability principles during the two funnels of NPD.

The reconfiguration process based on the incorporation of the sustainability principles into the company's strategy takes place in a dynamic manner. It is worthy to highlight that the NPD process is a necessary condition, but not sufficient to create a competitive advantage, which is in line with the position of Eisenhardt and Martin (2000). A remaining issue is whether, at the first moment, the incorporation of sustainability in the corporate strategy may influence the NPD performance negatively in other competitive dimensions like cost, quality, delivery and flexibility. One possible cause of a negative result is that the processes will be more complex, comprising new procedures and actors involved when sustainability concerns are present.

Other operational capabilities were also identified in the case analyzed. *Improvement, Innovation and Responsiveness* are present in the Technology Funnel because Natura seeks to respond to new demands related to sustainability, which includes those from local communities, suppliers and the market. The Product Funnel has the capabilities of *Communication and Integration* because they are central for the development of the NPD process when sustainability is present.

Therefore, we may state that the presence of sustainability in Natura's corporate strategy has influenced the whole NPD process, including the Technology and the Product Funnels. Therefore, the NPD process and capabilities have been affected by the sustainability concerns in the case analyzed.

This study has as a primary limitation, namely, the fact that it is a single case study. Nevertheless Natura is an enterprise with unique characteristics in Brazil and even in the international realm for a far broader base of comparison. Natura competes with other leading companies in Brazilian and Latin American markets with successful results. One of the authors has a professional engagement with the company, which may impart some level of partiality to the analysis done. As the other author is not related to the company, he had a key role in the data and information analysis. Furthermore, the

study is essentially qualitative, which may bring some level of subjectivity to the case analysis.

During the process of investigation and analysis, opportunities arose for future research, such as evaluating the real impact of the fact that companies like Natura open their capital. Besides this, the different perceptions about the social impact, polarized between the beginning and the end of the supply chain, highlight the discussion of integration of the actors in the organizational capabilities. This difference may impact decision-making and the organization's relations with its stakeholders. This approach would potentially help to minimize this fragmentation of focuses within its supply chain.

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