Dynamic Capabilities and Business Model: An Analysis of Radical Innovation inside Midsized and Large Companies in Brazil

Karine Liotino, Marilia Carvalhinha, João Amato, Paulo Tromboni, Abrahan Yu
University of São Paulo. Butantã, São Paulo, Brazil

Abstract--**Theories on innovation management argue that the life cycle of radical innovation projects is different from life cycle of incremental innovation projects, as the last one have higher risks and uncertainties. As a result, the skills that a business needs to develop innovation are directly related if they are incremental or radical. Many discussions on radical innovation theme are focused on large companies or startups, but few extent discusses to medium-sized enterprises. In this work, we selected two cases of Brazilian companies in the textile sector, one of a large company and other of a midsize one, in order to draw a comparison between them, considering that they compete in a new market with similar technologies, but with diferente sizes.**

The main dynamic capabilities identified were: ability to manage uncertainties; ability to create and participate in networks, ability to attract external resources; attract and retain innovative people; adaptability and strategic flexibility. These are the dynamic capabilities that had different grades of influences in innovation of both companies. However, the size and knowledge about the marketdid not influenced in their capabilities and ability to field of technology, but in the way they explore and communicate the innovation and their business model selection.

I. INTRODUCTION

Authors argue that innovation goes beyond investment in R & D and new technologiesas a wider and complex process resulting from interactions at local, national and global levels, between individuals, companies and other institutions producing knowledge. In the present scenario, in a globalized economy in which the benefits of knowledge dissipate very fast, characterized by high competitiveness, product quality and fierce competition, more and more business success depends on the company's ability to innovate, launching new products in the market, a lower price with better quality and at a faster rate than its competitors, which requires companies a set of capabilities and skills applied in day-to-day of their operations [28, 1, 19, 33].

However, it is understood that this set of capabilities that a company needs to develop innovations is directly related and differs depending on the nature of innovation: incremental or radical.

Incremental innovations are defined as those developed from something already done by the company in a continuous process, ie small, but significant technological and operational advances able to bring great [33]. Radical innovations are recognized by transforming the relationship between consumers and suppliers, restructure economic aspects of the market, destabilizing existing products and give rise to completely new product categories, ie, completely change the market dynamics and how the individuals involved are related [15].

Based on these differences, the authors argue that the life cycle of radical innovation projects is different from the cycle of projects developing incremental innovations due to the large number of uncertainties and characteristic discontinuities of radical innovation projects. Consequently, these projects require businesses different skills [14, 15].

In this context, considering that there are different types of organizations, with different sizes and maturity in the markets, it is necessary to understand, from the existing literature, the internal factors that lead the organizations to their success in development of radical innovations. In this sense, this paper contributes to this understanding by investigating the followuing question in two textile Brazilian companies: What dynamic capabilities contribute to the development of radical innovations and what is the difference between these capabilities in midsized and large-sized companies?

The choice of cases was deliberate so that it is possible to draw a comparison between the two different sized companies considering that they compete in a new market with similar technologies.

II. LITERATURE REVIEW

A. Dynamic Capabilities

Authors argue that, as the radical innovation projects are characterized by high risky ,uncertainties and ambiguities, success is associated with the persistence of one or more individuals of the organization. Althrought, the evolution of studies in this areahave been proposing management models that contribute to the systematic development of radical innovations by companies, but to put them into practice require organizations to develop a range of skills.

Considering that the development of radical innovations depends not only on individual effort, this article was developed from the perspective of the theory of dynamic capabilities, discussing the organizational characteristics of large and medium sized companies developing radical innovations, in order to draw a comparison about their ability to develop innovation and business models adopted to exploit it in their respective markets.

It is understood as dynamic capabilities the ability of companies to achieve new forms of competitive advantage based on specific, identifiable processes such as product development, strategic decision making and alliances, which can be replicated by the company, but difficult to be imitated by competitors. The "dynamic" term refers to the company's

ability to renew skills in order to cope with changes in the business environment, being able to respond quickly to technological developments. The term "training" refers to the key role of strategic management to adapt, integrate and reconfigure internal and external organizational skills, resources and operational skills to meet the demands of a constantly changing environment [29, 7].

Dynamic training is considered by some authors a mechanism to create new knowledge [12].

Other researchers describe it as the company's ability to learn and how they learn is the main catalyst to develop their strategic and dynamic capabilities [7, 34].

Prahalad and Hamel [23] defined the concept of "core competence" as the collective knowledge acquired by the organization, particularly those related to coordination of the various company's production skills and integrate different technological chains.

Teece et al. [30] identified three factors that determine the dynamic capabilities of a company, namely: (1) organizational and managerial processes, defined by how things are coordinated and carried out in the company, their routines, standards and learning; (2) positioning, which refers to investment in technology, intellectual property, organizational structure, complementary assets, the company's reputation and relationships with customers and other external agents, (3) and the paths that the company can follow options, or is the strategic alternatives available.

Teece [31] defines it as a microfoundation for radical innovation the ability to recognize, collect and select information related to technology, market and competitiveness, the internal and external environments of the company, to then direct its developments. With this pourpose, the company develops R & D activities and open innovation, seeking, understanding and anticipating information from its customers, suppliers and other agencies involved in the company's ecosystem.

This author also consider itthe company's abilityto adapt to consumers and technological change, being open to participate in the international market and keeping exposed to opportunities and threats associated with rapid technological change.

This posture of the company in the global context must be directed to the transformation of market dynamics, as it mustpromote changes in products or services already consolidated. The technological evolution, in this case,combine multiple devices, creating goods and/or services directed to consumer needs [32].

B. Skills to radical innovations develop

The evolution of the theory dealing with radical innovation considers the development of new business and product lines diferent enough to renew competitive status. To develop them it is required special management practices from the companies, used to the practice of incremental innovations [4, 18, 11].

Leifer et al. [14] highlighted two characteristics strongly present in the project cycle of radical innovations: (1) radical innovation produces more failures than successes and; (2) the magnitude and timing of the results are highly unpredictable, which consequently demand specific business skills.

In the table below it is shown other features that differentiate the character between incremental and radical innovation, and consequently impact in the skills that the company needs to develop:

TABLE 1 - INCREMENTAL INNOVATION VERSUS RADICAL INNOVATION

INCREMENTAL INNOVATION VERSUS RADICAL INNOVATION		
	INCREMENTAL	**RADICAL**
Project Time	Short – 6 months to 2 years	Long – 10 years or more
Trajectory	Linear and continuous.	Discontinuous and with gaps.
Generation of ideas and recognition of opportunity	The generation of ideas and recognition opportunities occur early in the project and events are anticipated.	The generation of ideas and recognition of opportunities occurs sporadically throughout the project life cycle.
Process	Formal process from the generation of ideas, to the development and commercialization.	It has a formal process to obtain and maintain resources, which is, in a sense, ignored by project teams and begins to be considered just when the project enters in the development phase.
Business Model	A complete and detailed business plan is developed early in the process, as the level of uncertainty is relatively low.	The business model is based on the discovery and development of technical and market knowledge throughout the project in order to reduce uncertainties.
Actors	Functional teams with defined competences and responsibilities of each member.	Key actors come and go throughout the project development cycle. Many participants collaborate with information from networks maintained by the company.
Organizational structure	Typically teams of international projects operating within the business unit.	Generally the project starts in the R&D area and migrate to other areas of the company for the incubation and acceleration processes.
Resources and Skills	The project teams have all the skills and budget necessary to undertake the project from start to finish.	Ability and skills need to be acquired during the project development cycle from the variety of sources of internal and external resources.
Involvement of operational units	They are involved from the beginning of the project	There is an informal involvement of some important business units throughout the project development, later to be a business unit designated specific to it.

Source: Leifer et al. [14] adapted by authors.

McDermott and O'Connor [18] propose that there are two types of radical innovation. The first is designed to strengthen the company's position in a market in which it already operates, called the family market. In this case, the development process and the necessary infrastructure to access the market and consumers are better known and understood by the company. The second type of innovation is when the market is not known or developed by the company, and consequently demand greater efforts to manage the uncertainties and risks. That is, the greater the ignorance about the project, the greater the risks and uncertainties involved in radical innovation will be.

Leifer et al. [14] segmented the theory into three different types of radical innovation designs:

1. Innovation in the fields of technology and market existing business: new products to a market that the company already serves.
2. Innovation in gaps in the existing business of the company: Business scope expansion; meet new customers in new ways.
3. Innovation outside the current strategic context of the company: category will present more uncertainty for the company.

The same authors emphasize that the life cycles of radical innovation projects are characterized by being long, because they have high uncertainty and discontinuities, gaps, critical transitions, leverage points, application changes over its development, changes in business unit. From these points, it is possible to identify the management practices, organizational approaches, skills and resources needed for successful projects [14].

That said, it is argued that radical innovation is very difficult to be managed and sustained, as each change in business requires the development of specific skills [4, 14]. In this sense, the authors Leifer et al.[14] developed the theory and proposed critical management factors that a company needs to develop radical innovations:

- Decisive factor 1 - Create a center of radical innovations to oversee and encourage projects, reducing organizational and uncertainties relating to resources without increasing bureaucracy, which will serve as the primary basis for those who play a key role in the development of radical innovations. This center will take place training, mentoring and other processes related to the selection, incubation and acceleration of radical innovation.
- Decisive factor 2 - mobilize hunters and centralizing, or create an environment where people with market knowledge and organizational have individual initiative to bring ideas to the so-called centralizing ideas that are in R & D centers and business units ready to receive promising ideas for evaluating them, redirect them and empower them within the company.
- Decisive factor 3 - monitor and redirect projects, ie overcome the conservative mentality focused on the tasks of control in favor of monitoring attitudes and redirect strategies and projects in order to reduce risks differently from those made in incremental innovation projects.
- Decisive factor 4 - develop a set of skills for fundraising, because usually the radical innovation projects go beyond the budget available for projects are long and take too long to produce results. The radical innovation center can recruit or train people for this skill that may act raising funds from different internal sources and / or external to the company.
- Decisive factor 5 - speed up the transition of the project, not letting them stay for an excessive period in the R & D area and then at some point take you for a drive operations for placing on the market, and this process will need technical, marketing and organizational uncertainties to be overcome. It is noteworthy that the development of radical innovation center is a decisive factor in managing this process.
- Decisive factor 6 - find the right people to undertake radical innovation, which are prone to take risks with initiative and broad vision. It is necessary to develop initiatives to recruit, develop and keep these people in the company considering, including a system of rewards for radical innovation.
- Decisive factor 7 - mobilize the various roles of leaders where executives can act as (1) patrons of the projects, giving organizational protection, generating resources and attracting innovative; (2) creating challenges as motivating and stimulating creativity and (3) as molders of organizational culture in order to make it natural, acceptable and valued.

III. METHODOLOGICAL ASPECTS

To survey the main publications related to the subject search was conducted in April 2015 in the scientific database Web of Science from the keywords "radical innovation"; "disruptive innovation" and "capability for radical innovation". As criteria for the search were only considered articles in English, Portuguese and Spanish and classified among the areas of focus "business economics; engineering; operations research and management science science technology topics others".

There were three criteria for selection of publications found. The first considered publications that presented the keywords in the title of the study; the second considered the relevance evaluated from the number of citations made by other authors and the third considered the year of publication and selected studies with little or no quote, but published from January 2014.

From the search conducted at the base Web of Science were identified 257 publications for keyword radical innovation; 105 publications for disruptive innovation and 14 publications for capability for radical innovation. Among the studies found, were identified, based on the defined criteria, 33 studies. From these studies identified, their abstracts were

studied by analyzing the relationship between the themes and the subject of this research, resulting in the selection of the publications used as the basis of the theoretical framework of this article, namely: [3, 8, 13, 15, 16, 17, 18, 20, 21, 26].

In addition to the articles selected were considered two books focusing on the theme radical innovation: Leifer et al. [14], O'Connor et al. [22]. From the references of these books a snowball survey was conducted to identify other publications relevant to the theme, such as: Prahalad and Hamel [23]; Christensen, C. [4]; Hamel [11]; Zolo and Winter [33].

Based on this literature was carried out an analysis and consolidated the main organizational skills characteristics to undertakings radical innovation to then confront them with two empirical cases with two companies in the textile sector, one large and the other mid-size to compete in the same market with similar radical innovations.

Both companies were selected because they have launched in recent years technological products created a market that we call functional textiles, where clothing is no longer just an aesthetic enhancement and protection and is replaced by functionality in this case, impact on health and sports performance users. In this sense, depth interviews were conducted from a semi-structured with managers of product areas, innovation and marketing of these companies.

Exploratory research is characterized by no elaboration of hypotheses to be tested at work, have as one of its purposes to clarify concepts and ideas. It is suggested to exploratory research when researchers have little knowledge of a real phenomenon and there is little literature on the phenomenon [7, 10]. To conduct the case study adopted the methodology proposed by Eisenhardt [7], where the following steps are performed: structuring of the research problem, setting of research objectives, building the conceptual framework, definition of field research protocols , selection of cases, the data collection, data analysis and discussion of the obtained learnings.

Because it is strategic information of the companies, it was decided to keep their identity confidential. For teaching purposes to large company was named Company G, the medium-sized company as a company M.

IV. CASES DISCUSSION

The company M began in the aesthetic market developing and commercializing technologies that emit infrared long and that contributed to improvement of blood circulation and resulted in improved well-being and health of the user. The innovation has been developed and improved in Japan in partnership with universities of that country.

Insofar as the cosmetic market was being absorbed by the doctors, the company felt the need to evolve and seek new market segments and thus started to intensify research activities to apply the technology, previously used in aesthetic equipment in textiles that could be all the time in contact with the user's skin. Until the research and development of applicability and regulatory compliance took about seven years so that the company could commercialize the technology in Brazil.

Already the company G is a multinational chemical industry and therefore is at the beginning of the textile and clothing production chain. In Brazil is one of the leading suppliers of polyamide thread and is established as a leading supplier of this raw material for the textile industry and Brazilian cooking. However, on the competitiveness front of the Chinese products started to lose market share to imported products of equal complexity and lower price. In this sense, they opted for a strategic shift which began to offer consumers functional products with benefits that go beyond the dressing. No longer just sell what was already established and started to worry about developing products that maintain a functional relationship with the consumer.

Because of the new products are innovative, products already established became less attractive to consumers, so the company started to explore different prices and the public, so far not worked, health and sports sectors.

Both companies have the ability and dynamism to change its strategic routes and through innovation were able to explore a new market hitherto non-existent and a new class of consumer products related to health, wellness and sports performance, exceeding the function of clothing as well as fashion and clothing.

For this, the company M advantage of existing partnerships with universities to develop products impactassem health associated with textiles, and sought to establish partnerships with renowned doctors and Brazilian institutions linked to health to prove the benefits provided by technology, thus creating , a network of people and partners that could test, validate, develop and recommend the product. It was also dynamic in choosing to further explore the benefits focused on health in relation to the aesthetic benefits of using technology because, with this strategic decision was no impact on the business model, production infrastructure, the regulatory aspects, communication and the actors chosen to form a collaborative network.

The company G, even starring in an established market, was to change the dynamic producer of strategic placement of commodities for a company that develops innovative products and solutions, offering wired special properties that provide benefits to users. For it has changed its organizational structure and how to develop its products, integrating the areas of R & D to marketing and involving the customer in developing the application of new technologies.

In both companies the technology has become the main driver of the business and all areas needed to adapt to fit in the legislation, explore, communicate and sell the innovation appropriately.

The two companies have organizational and managerial processes, routines, standards and learning processes, the difference is in proportion to the involvement of the company as a whole. The company G is divided into focused business units for the development of innovations and their sales, but

still maintains production facilities and business producing and selling traditional products already established, but that gradually are representing less in the company's efforts. Already the company M has its entire structure geared to develop and exploit innovation. The business model is all based on technology and expansion plans focus on exploring it more and more.

Both the company G as the company M relates very well with external actors, are in constant contact with your customers and connected with universities in Brazil and abroad to validate the technology and improves it, participating in the international market to be able to have more credibility in relation to the product benefits and to create a critical mass able to test, question and encourage use. Moreover, they are creating a network of opinion leaders in health and sports performance to test and disseminate the benefits of innovation and connecting with the international network that monitors and develops technologies for the segment targeting are tuned to the technology trends and developments market, which can help them identify new opportunities for development and market exploration.

Both innovations, despite competing in the same market, have different technological processes and patented, took years to be developed, regulated and placed on the market. Throughout the process, it took 5-7 years, many discontinuities, comings and goings happened to predict how to communicate and the business model strategy for both companies. The regulatory issue impacted the way in which companies could explore, communicate, direct and sell their respective innovations.

When it comes to risk and positioning, the company G, by already being a marketing company established in that worked and to be at the beginning of the chain and not have complete mastery of the production of fabrics and clothing, had innovation the possibility of offering to its customers a new product with higher added value so they could explore new business with new consumers who care more about health, wellness and sports performance, in addition to issues of fashion and clothing. Therefore, in accordance with the proposing Leifer et al. [14] for her innovation was a way to offer new products to a market that the company already knew and in some cases was already established.

Already the M company, which started in the equipment market for the segment of aesthetic clinics, had to innovate to fill gaps in its business that was going through changes, so through innovation chose to expand into a new segment, the textile and then went on to serve new consumers with a new product in a different way.

However, even having developed an innovation which offered something new for a new class of consumers, neither company has a research center and formalized development as proposed by the literature Leifer et al . [14]. They have professionals connected with researchers and universities in the world and monitor technological trends for the sector. But today, the focus of the two companies has been to maximize the results of the innovations already developed by investing in communication, marketing and refining their business models.

The company issues the research activity, development and marketing are in the hands of employees, researchers, technicians and engineers who have autonomy to research, develop and test products both technically and mercadologicamente. The company M the function of technological prospecting, establishing partnerships and sales passes through the hands of the owners partners that stimulate their domestic researchers to be always connected to the external network of research and development (universities, incubators, medical centers).

The two companies have very similar capabilities within its dimensions, and both the deciding factors proposed by Leifer et al. [15] appear, but still unstructured, especially in relation to radical innovation center, which will probably take some time to be structured close to the model that has been proposed in the literature.

In summary, the main dynamic capabilities identified in both companies are: ability to manage uncertainties; ability to create and participate in networks, ability to attract external resources; attract and retain innovative people; adaptability and strategic flexibility.

But despite having very similar capabilities, can be highlighted as the main training that differentiate how exploit the technology, ie the business model.

Because the company G already have an established market and a business model very well defined, she chose to compete in a totally different way of M. While the company now issues pushed the technology to its customers (knitting, weaving, clothing) and outlined a joint strategy with them, the company M to be able to spread their products, had to create their own brand and develop the entire production structure, producing the yarn to clothing and retail structure, to thus be able to reach the market.

V.CONCLUSIONS

Innovation is the result of a complex process of multistage interrelated multistages through which organizations make decisions converting ideas into products, processes, services or business models in order to progress, compete or differentiate.

The understanding of the companies that innovation is the result of a processinduce them to manage it in terms of inputs, outputs, activities and sub-processes, control means, goals, parameters and resources, in the way of the systematic innovation.

The management of these processes ends up with the identification of facilitating and inhibiting factors for the innovation’s generation. In this sense, the literature has defended that, to develop radical innovation, it is also necessary to develop, manage and systematize these processes inside the organization.

Manage innovative process is significantly different from managing other operational activities in the company.

Applying operations management models in the management of radical innovation is a big mistake. Desevolver to radical innovation the company needs to develop additional skills and add them to the organizational capabilities that the company already has in order to develop a management process that allows the company to innovate radically systematically.

These additional capabilities involve different areas and aspects of the company that should have skills, expectations, metrics and different behaviors of the traditional organizational capabilities over goals and strategies on innovation, human resources and profile of project teams.

The function innovation at new business has a central role in identifying new opportunities where the company can innovate radically. This function must work across the board throughout all areas involved in the project. Project teams should work with a portfolio that support them to develop new company's business based on the radical innovation generated as a result of the projects. These projects need to have people with different expertise of those involved in other organizational functions of the company as well as different goals for project performance evaluation.

In this context, considering that there different sized companies may have different and access stages and maturity in the market, we identified the need to understand, from the existing literature, the internal factors for organizations that lead them to be successful in development of radical innovations. In this sense, this paper aimed to contribute to this understanding by answering the question: What dynamic capabilities contribute to the development of radical innovations and what is the difference between these capabilities in mid-sized and large-sized companies?

For the development of this survey it wasselected two cases of Brazilian companies in the textile sector, large and midsized, in order to draw a comparison between them, considering that they compete in a new market with similar technologies.

The main dynamic capabilities identified were: ability to manage uncertainties; ability to create and participate in networks, ability to attract external resources; attract and retain innovative people; adaptability and strategic flexibility. These are the dynamic capabilities that had different grades of influences in innovation of both companies. However, the size and knowledge about the marketdid not influenced in their capabilities and ability to field of technology, but in the way they explore and communicate the innovation and their business model selection.

The company G develops IT products internally using its team of internal researchers, while the company M develops it using external resources through partnerships with universities and the research institutes. They also differ in the business model approach to the market. The company G, which is a leading supplier of polyamide fibers and is at the beginning of the textile chain, used its customer network established to disseminate innovation, attaching the brand of technology to their master trademark, aware that these technologies' brands will also be attached to their clients and their fabrics and clothes.

As the company M does not have a consolidated market brand image, it opted for a vertical model, developing a brand and a production structure that supply with yarn to garments to domestic and international markets.

Both companies have skills that led them to develop and maintain the innovations, but different capabilities have made them adopt different business models to exploit them. While the company G decided to maintain its current position in the chain and to push the technology to its customers (knitting, weaving, clothing) drawing a joint dissemination strategy with them, the company M, with less bargaining power, had to create their own brand and develop the entire production structure, producing the yarn to clothing and retail structure, in order to reach the market.

REFERENCES

[1] Arbix, G. A. T .: *Innovate or innovate: the Brazilian industry between the past and the future.* Thesis (Habilitation) - Faculty of Philosophy, Letters and Human Sciences, University of São Paulo, São Paulo, 2006.

[2] Hart, Amado L .; Bervian, Peter A .: *Scientific Methodology.* Publisher Prentice Hall, 5th edition 2002.

[3] Chang, Yuan-Chieh; Chang, Huo-Tsan; Chi, Hui-Ru; Chen, Ming-Huei; Deng Li-Ling: How do established Firms Improve radical innovation performance? *Technovation,* v. 32, 441-451, 2012.

[4] Christensen, C .: *The Innovator`s dillema.* Harvard Business School Press. Boston, 1997.

[5] Cooper, Robert G..Perspective: The Stage-Gate Idea-to-Launch Process - Update, What's New, and Nexgen Systems. *Journal of Production Innovation manager*, v. 25, p. 213-232, 2008.

[6] Eisenhardt, Kathleen M .: Building Theories from Case Study Research. The Stanford University. *Academy of Management Review*, vol. 14, No. 4, 532-550, 1989.

[7] Eisenhardt, Kathleen; MARTIN, Jeffrey A .: Dynamic capabilities: what are they? *Strategic Management Journal*, Vol. 21, p. 1105-1121, 2000.

[8] Ettlie, John E .; Bridges, William P .; O'KEEFE, Robert D .: Organization strategy and structural differences is radical innovation. *Management Science*, vol. 30, no. 6, 1984.

[9] Drucker, P .: The Discipline of Innovation. *Harvard Business Review*, vol. 80, p. 95-104, 2002.

[10] Gil, Antonio Carlos. *Methods and techniques of social research*. Editora Atlas, 6th edition, 2008.

[11] Hamel, G .. Leading the Revolution. *Harvard Business School Press*, 2000.

[12] Henderson, R. M., Cockburn, I .. Measuring competence: Exploring firm effects in pharmaceutical research. *Strategic Management Journal.* n. 15, p. 63-84, 1994

[13] Kelley, Donna J .; O'connor, Gina C .; NECK, Heidi; PETERS, Lois .: Building an organizational capability for radical innovation: The direct managerial role. *Journal of Engineering and Technology Management*, Vol. 28, 249-267, 2011.

[14] Leifer, Richard; Mcdermott, M. Christopher; O'connor, Gina Colarelli; Peters, Lois S .; Rice, Mark R .; Veryzer, Robert W .: *Radical Innovation - How mature companies can outsmart upstarts*. Harvard Business School Press: Boston, in 2000.

[15] Leifer, Richard; O'connor, Gina C .; Rice, Mark: The implementation of radical inovaçãoo in mature companies. *Journal of Business Administration,* São Paulo, v. 42, no. 2. P. 17-30, 2002.

[16] Leifer, Richard: Research on corporate radical innovation systems - the dynamic capabilities perspective: The introduction. *Journal of engineering and technology management,* v. 24, 1-10, 2007.

[17] Markides, Constantinos: Disruptive innovation: in need of better thory. *Product Innovation Management,* Vol. 23, 19-25, 2006.

[18] Mcdermott, Christopher M .; O'connor, Gina C .: Managing Radical Innovation: an overview of emergent strategy issues. *Product Innovation Management,* Vol. 19, p. 424-438, 2002.

[19] Mello, Adriana Marotti; Lima, Wander Demonel Of; Good, Eduardo Bilas; Sbragia, Roberto; Marx, Roberto. Innovative capacity and advantage: a case study of Brazilian Firms. *Journal of Technology Management and Innovation,* São Paulo, v. 5, no. 2, p. 57-72, 2008.

[20] O'connor, Gina C .; Mcdermott, Christopher M .: The Human side of radical innovation. *Journal of engineering and technology management,* v. 21, 11-30, 2004.

[21] O'connor, Gina C .; Demartino, Richard .: Organizing for radical innovation: an exploratory study of the structural aspects of RI management systems in large established Firms. *Product Innovation Management*, Vol. 23, 475-497, 2006.

[22] O'connor, Gina C .; Leifer, Richard; Paulson, Albert S .; PETERS, Lois S. *Grabbing lightining: building the capability for breakthrough innovation*. Sam Francisco: Jossey-Bass, 2008.

[23] Prahalad, Ck .; Hamel G..The core competence of the Corporation. *Harvard Business Review*, May-June, p. 79 - 91, 1990.

[24] Rice, Mark R .; O'connor, Gina C .; Pierantozzi, Ronald: Implementing a Learning Plan to Counter Project Uncertainty. Cambridge: *MIT Sloan Management Review*, Vol 49, No. 2, 2008.

[25] Salerno, Mario S .; Gomes, Leonardo A. V .; Silva, Debora O .; Bagno, Raoni B .; Freitas, Simone L. T. U .: Innovation processes: Which process is Which project? *Technovation*, v. 35, p. 59-70, 2015.

[26] Sandberg, Birgitta; Stenroos, Leena A .: What makes it so Difficult? The systematic reviw on barriers to radical innovation. *Industrial Marketing Management,* Vol. 43, 1293-1305, 2014.

[27] Silva, Deborah O .; Bagno, Raoni B .; Salernos, Mario S .: models for innovation management: literature review and analysis. *Production*, v. 24, no. 2, p. 477-490, 2014.

[28] Sbragia, R .; Stal, Eva; Belfry, M. A .; Andreassi, Tales. *Innovation: How to overcome this business challenge.* Leaders Forum, Clio, California, in 2006.

[29] Teece, D. J .; Pisano, G .; Shuen, A. Dynamic capabilities and strategic management. *Strategic Management Journal*, Vol. 18, no. 7, p. 509-533, 1997.

[30] Teece, D. J. Explicating dynamic capabilities: the nature and microfundations of (sustainable) enterpriese performance. *Strategic Management Journal*, v.28, p.1319-1350, 2007.

[31] Teece, D. J. Business Models, Business Strategy and Innovation. Long Range Planning, vol 43, p. 172-194, 2010.

[32] _____. Explicating dynamic capabilities: The nature and micro foundations of (sustainable) enterprise performance. *Strategic Management Journal*, Vol. 28, p. 1319-1350, 2007.

[33] Tidd, J; Bessant, J. *Managing Innovation: Integrating Technological, Market and Organizational Change.* John Wiley & Sons, 4th edition 2009.

[34] Zollo, M., Winter, S.G .. Deliberate learning and the evolution of dynamic capabilities. *Organization Science* n.13 (3), p.339-351, 2002.