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PROCESS INNOVATION: A SURFING MANUFACTURER CASE STUDY

¹Isabel Cristina Scafuto
²Ana Claudia Belfort
³Gislaine Teixeira
⁴Emerson Antonio Maccari

ABSTRACT

Companies tend to adopt formal methods of product innovation, reinventing business processes to improve their speed and efficiency. Although the economic impact of process innovations is as relevant as the introduction of new products or services, this subject is often neglected in the general innovation literature. Aiming to contribute to scientific discussions, this study provides empirical evidence of process innovation by small businesses and its implications from the recent innovation theory perspectives (Un & Asakawa, 2015; Suárez-Barraza, 2013, O'Reilly & Tushman, 2004; Harmon, 2015). Classified as qualitative and exploratory research, it was conducted as a study method at a Brazilian company that manufactures surfing equipment. The main results demonstrate that incremental and architectural innovations co-occur. Furthermore, because they are effectively implemented, they require business process changes. The findings show that an integrated and adequate combination of the different types of innovation tends to contribute to the improvement of business results.

Keywords: Process Innovation; Innovation Continuum; Surf Industry.

¹ University Nove de Julho-UNINOVE, São Paulo (Brazil). Orcid: < <http://orcid.org/0000-0002-6788-3325> >
Email: <isabelscafuto@gmail.com>

² University Nove de Julho-UNINOVE, São Paulo (Brazil). Orcid: < <http://orcid.org/0000-0003-4168-9791> >
Email: <belfortanaclaudia@gmail.com>

³ University Nove de Julho-UNINOVE and Fundação Getúlio Vargas-FGV/SP, São Paulo (Brazil). Orcid: < <http://orcid.org/0000-0001-5829-5735> > Email: <gislainesteixeira@gmail.com>

⁴ University Nove de Julho-UNINOVE, São Paulo (Brazil). Orcid: < <http://orcid.org/0000-0001-7085-224X> >
Email: <emersonmaccari@gmail.com>

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NOVAÇÃO EM PROCESSOS: UM ESTUDO DE CASO DE FABRICANTE DE EQUIPAMENTOS PARA SURFE

RESUMO

Empresas tendem a empreender metodologias formais de inovação de produtos, reinventando processos de negócio visando maior velocidade e eficiência. Embora economicamente os impactos das inovações em processos sejam tão relevantes quanto a introdução de novos produtos ou serviços, o tema é muitas vezes subestimado na literatura de inovação em geral. Visando contribuir com as discussões científicas, este estudo traz evidências empíricas sobre as inovações em processos realizadas por empresas de pequeno porte e suas implicações à luz de recentes teorias de inovação (Un & Asakawa, 2015; Suárez-Barraza, 2013, O'Reilly & Tushman, 2004; Harmon, 2015). Classificada como qualitativa, de natureza exploratória, a pesquisa foi conduzida a partir do método de estudo de caso realizado em uma empresa nacional que fabrica equipamentos para surfe. Os principais resultados indicam que inovações incrementais e radicais co-ocorrem. Além disso, porque elas são efetivamente implementadas, elas exigem mudanças nos processos de negócios. Os resultados mostram que uma combinação integrada e adequada dos diferentes tipos de inovação tende a contribuir para a melhoria dos resultados das empresas.

Palavras-chave: Inovação em Processos; *Continuum* da Inovação; Indústria do Surfe.

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INTRODUCTION

Change is an essential characteristic of organizational life. Therefore, new products, processes, services and organizational formats are devices used by companies to increase their competitive potential (Ettlie & Reza, 1992). Companies tend to commit to formal methods of product innovation, reinventing business processes with a view to greater speed and efficiency (Hamel, 2006; Guerrazzi, Zanin & Falaster, 2017). Changes in structure and work processes can help companies seeking to reduce costs, improve quality and gain other advantages (Davenport, 1993). Although the impact of process innovations is economically as important as the introduction of new products and services, the theme is often overlooked in the general literature on innovation (Reichstein & Salter, 2006; Adams, Bessant & Phelps, 2006; Macher & Mowery, 2009; Crossan & Apaydin, 2010).

Considering the initially outlined context, centering on the importance of the theme of process innovation and the little attention it has received from scholars, the research question guiding this study is: *How are process innovations conducted by a Brazilian surfing equipment manufacturer?* Therefore, the main object of this article is to analyze process innovations by small enterprises and their implications in the light of recent theories on innovation. The studies of Un and Asakawa (2015), Suárez-Barraza (2013), O'Reilly and Tushman (2004) and Harmon (2015) serve as the theoretical basis for this empirical study.

To answer the research question, applied research of an exploratory nature and a qualitative approach were used (Martins & Theóphilo, 2009; Marconi & Lakatos, 2011). The research strategy was based on bibliographic research (Martins & Theóphilo, 2009) and the single case study was adopted as a methodological approach (Yin, 2010). The analysis unit was Tropical Brasil (TB), a Brazilian manufacturer of surfing equipment. The data were collected from interviews, document analysis and files. These were analyzed and triangulated for the convergence of data from multiple sources (Yin, 2010).

The analysis of how process innovations by a Brazilian manufacturer of surfing equipment offers a theoretical and practical contribution. The scope of the concept of innovation constantly permeates the entire life of a company, allowing it to enjoy its benefits, irrespective of its size. The case shows that even small companies can innovate, as this is a less distinctive and broader concept, because what matters is that all companies seek changes that can help them to survive in a highly competitive market. Finally, processes permeate any company, which corroborates the literature regarding the importance of studies on this theme.

The article is divided into six sections, including this introduction. In Section 2, there is a review of the literature on process innovation. The research methodology is outlined in Section 3, followed by the results for the case in question in Section 4. The results are discussed and compared with the literature in Section 5, and the article draws to a close in Section 6 with the final considerations, limitations and suggestions for future studies in this field.

PROCESS INNOVATION

Process innovation means conducting an activity in a new way and implies the use of specific tools of change and the transformation of business processes (Davenport, 1993). According to the Oslo Manual, process innovation may be defined as:

[...] the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products (OECD, 1997, pp. 58-59).

Studies that address process innovation generally begin by discussing the difference between product and process innovation. This is

an important distinction for research purposes, as the different mechanisms explain why insights of product innovation analysis cannot be directly applied to an analysis of processes (Un & Asakawa, 2015). Furthermore, it is useful when

there is a mix of two types of innovation, such as when a company introduces a new product that also requires the development of a new process (OECD, 1997; Costa, Cabral, Forte & Costa, 2016).

Table 1: Relative Differences between Product and Process Innovation

Dimensions of Analysis	Product Innovation	Process Innovation
Objective of innovation	Novelty	Efficiency
Competitive impact	Price	Cost
Valuation of innovation or value	External market feedback	Internal, managerial evaluation
Degree of novelty valued or rareness	Radical, exploration	Incremental, exploitation
Codifiability of knowledge or imitability	Clear, concrete, explicit, higher	Unclear, obscure, tacit, lower
Location of knowledge or substitutability	Technological, separable, independent	Organizational, systemic, interdependent

Source: Un & Asakawa (2015, p. 140).

Table 1 shows that product innovation tends to be concentrated more on the technological aspects, with teams of specialists working on innovation. This partially limits substitution by competitors with different skills. On the other hand, process innovation tends to be more systemic and interdependent, as it requires collaboration between different units, and a change in the process of a company activity tends to affect related activities and areas.

Many companies now adopt a formal product innovation methodology and work systematically to reinvent their business processes to increase speed and efficiency (Hamel, 2006). Nevertheless, even the most innovative companies, when they have no manufacturing requirements and installed capacity, can fail in this respect (Teece, 1986). The revolutionary approach necessary for improving business performance must encompass both the structure and how this structure can be improved. In this sense, process innovations can help any company that seeks to reduce the cost of processes or time, or wishes to improve the quality, flexibility, service levels and other business goals (Davenport, 1993; Frizzo & Gomes, 2017).

Despite the little importance given to process innovations by academics and companies, Piening and Salge (2015) claim that they are important sources of competitiveness,

and they encourage research on their implications, antecedent and contingency aspects. Keupp, Palmié and Gassmann (2012) corroborate this and point out that research on this topic helps to improve understanding of how companies introduce innovations through organizational and managerial activities.

In this sense, the present study seeks to broaden the frontiers of knowledge in innovation by discussing the implications of process innovations.

Implications of Process Innovations

The aim of process innovations is to create competitive advantages through supporting strategies that reduce manufacturing or operational costs (Davenport, 1993). Damanpour, Walker and Avellaneda (2009) highlight that this type of innovation is characterized by its focus on the inside of an organization and how it seeks to improve the efficiency and effectiveness of operational and administrative processes.

A compendium of the literature by Suárez-Barraza (2013) identified the main results that stem from process innovations: (i) they reduce operational costs; (ii) they serve as a method for understanding the work that is done (how input becomes output); (iii) they are a mechanism for

locating, solving and preventing problems or errors in the work and improve the areas of the company; (iv) they reduce the time spent on processes; (v) they allow work to be measured more effectively and systematically; (vi) they allow the company to improve its customer services; (vii) they provide a systemic and transversal view of the company; and (viii) they improve teamwork and the integration of different areas of the company.

However, there are certain difficulties in implementing new processes in companies (McNulty & Ferlie, 2004; Edmonson, Bohner & Pisano, 2010), and in measuring process innovations, as value is basically created within the limits of the company (Ayhan, Öztemel, Aydin, & Yue, 2013). In this sense, some of the barriers that companies have to overcome when changing processes may be caused by financial issues (Klein, Conn, & Sorra, 2001), organizational climate and lack of managerial support (Choi & Chang, 2009), and even the organization's own structure (Douglas & Judge, 2001).

Process innovations sometimes tend to be affected by product innovations and vice versa (Piening & Salge, 2015; Damanpour & Gopalakrishnan, 2001; Reichstein & Salter, 2006). Some authors also claim it is possible for the same process to affect the production of several products, while the same product tends to imply the implementation of various processes (new or reformed). In this sense, Abernathy and Utterback (1978) claim that changes in a given process cause changes to many other processes of which they are an offshoot.

Decoupling product and process innovations is not considered an easy task, as industries tend to introduce new products and processes simultaneously. Ettlíe and Reza (1992)

state that both have closely related lifecycles, strengthening the integration of product and process innovation. To these authors, it is not enough to innovate products; it is also necessary to innovate processes.

Another aspect that deserves to be highlighted is that process innovations interfere in the conducting of business, and can be propelled by changes that stem from the businesses of a company. It is possible to innovate without harming the existing business and without mining new businesses, providing the company is ambidextrous, i.e., sufficiently able to implement incremental and revolutionary changes simultaneously (Tushman & O'Reilly, 1996).

In a later study, O'Reilly and Tushman (2004) associated ambidexterity with the simultaneous performance of exploration and exploitation strategies (O'Reilly & Tushman, 2004; Ramos, Matos e Mota, 2015). Exploration means competence to explore new opportunities (Raisch, Birkinshaw, Probst & Tushman, 2009) and includes elements related to research, risk taking, experimentation, flexibility and discovery (March, 1991). Exploitation can be defined as the competence to exhaust existing capabilities (Raisch et al., 2009) and includes refinement, choice, production, efficiency, selection, implementation and execution (March, 1991).

Successful companies tend to use both exploration and exploitation (O'Reilly & Tushman, 2004). These authors also recommend that to remain competitive companies need to pursue all types of innovation at the same time (Table 2), as some of these allow them to continue generating income (old businesses) and others enable them to explore new markets.

Table 2: Types of innovation

Type of innovation	Action	Result	Example
Incremental	Small improvements in existing products and operations.	More efficient operations and delivery of greater value to customers	Change in the design of a car engine to increase its power and fuel economy.
Architectural	Application of new technology or processes	Fundamental change to a component or element of business	Shifting the customer services call center to a low-labor-cost location, like India, taking advantage of communication capacity provided by the internet.

Discontinuous	Radical advances	Profoundly altered basis for competition in an industry, often rendering old products or ways of working obsolete.	Changes in the type of photography (digital) that changes the basis of competition in an industry, making products and ways of working obsolete.
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Source: Based on O'Reilly & Tushman (2004).

All of these types of innovation can have different purposes. Some innovations may serve the needs of current customers or the existing market, while other are intended for a totally new market that has yet to be clearly defined. These differences may be represented through what O'Reilly and Tushman (2004) refer to as a "Map of Innovation", the purpose of which is to identify how a company behaves when seeking innovations to help it remain competitive.

Specifically concerning process innovations, the degree of novelty valued or rareness is related to exploitation (Un & Asakawa, 2015), whose main characteristics include: (i) a structure focused on cost and profit; (ii) critical tasks related to operations, efficiency and incremental innovation; (iii) operational capabilities; (iv) formal and mechanistic structure; (v) control and rewards related to margins and productivity; (vi) culture centered on efficiency, low risk, quality and the customer; and (vii) authoritarian leadership (O'Reilly & Tushman, 2004). In this context, the study by Harmon (2015) emerges, which extrapolated the literature by relating changes to the business process, characterized by the incremental, architectural and discontinuous innovations proposed by O'Reilly and Tushman (2004), to process innovations.

The Innovation Continuum Proposed By Harmon (2015)

Any individual or company that attempts to promote change in business processes perceives that there are different business processes and that individuals from different traditions propose different approaches to change (Harmon, 2015). The author also claims that initiatives at the process level are concentrated in projects intended to create, recreate or improve specific business processes, and that companies are interested in methodologies and tools that can

help them to conduct business change projects. Therefore, changes in business processes can be viewed as being steeped in cultural aspects that lead to the adoption of different methods and techniques.

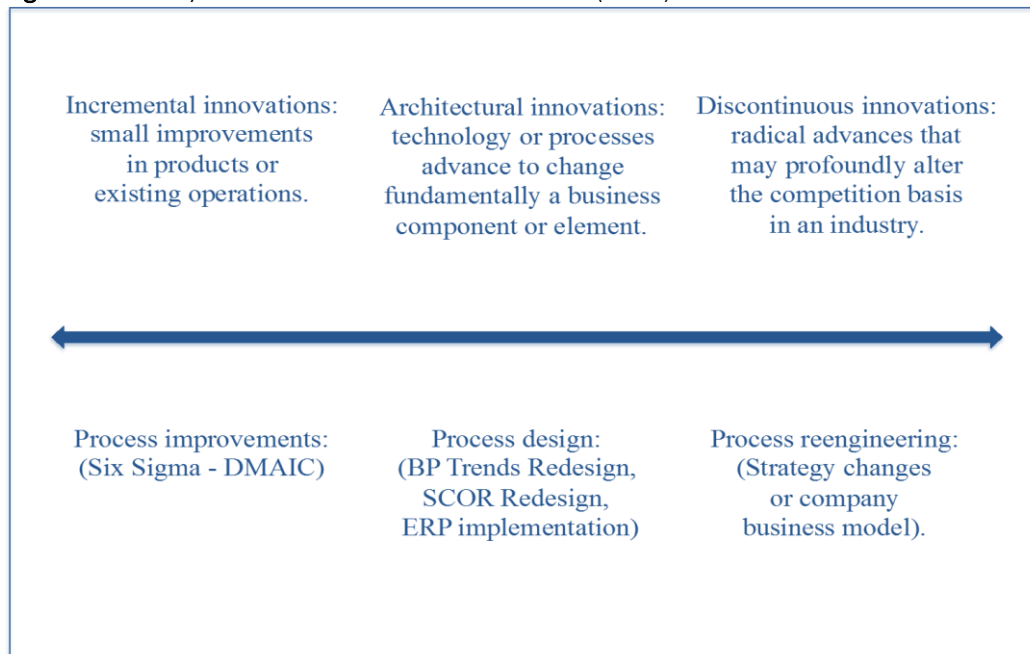
Specifically regarding innovation in the context of the business change process, the recent literature can be divided into three schools: (i) critical thinking, which highlights creativity as a series of associated techniques that can help teams to think of alternative ways of accomplishing a task; (ii) TRIZ methodology (Rechénia Izobretátelskih Zadátchi Theory), an inventive theory of Russian origin for solving problems and creating new possibilities; and (iii) innovation associated with the improvement of existing processes or a complete change in how business is done. The latter is based on Hammer (2004, as cited in Harmon, 2015). The type of distinction proposed by the third school is not very important as, in reality, all individuals and all companies seek new ways of doing things (Harmon, 2015). Thus, the author considers that innovation should be understood as a continuum and that the most adequate concept in this sense in the literature was coined by O'Reilly and Tushman (2004), after they investigated a series of different real examples of innovation.

In the original study of O'Reilly and Tushman (2004), although the authors mention the importance of companies simultaneously conducting processes of incremental, architectural or radical innovation to remain competitive, the matrix is referred to as a Map of Innovation rather than a Continuum. This is the point that highlights the extrapolation of the model in the view of Harmon (2015): innovation can be viewed as a continuum in which several innovations can occur in any direction and at the same time. The Map of Innovation proposed by O'Reilly and Tushman (2004) is obviously a continuum. There are various cases of innovation that are wrongly classified, if the line between

incremental and discontinuous innovations is considered (Harmon, 2015). In this sense, Figure

1 suggest why people use the term innovation to mean different things.

Figure 1: O'Reilly-Tushman Innovation Continuum (2004).



Source: Harmon (2015).

The name and characteristics of the three categories used by O'Reilly and Tushman (2004) to map the various examples of innovation that they studied are shown above the arrow in Figure 1. Below the arrow are the three general approaches to processing change: process improvement, process redesign and process re-engineering.

The innovation continuum enables an understanding of why business process innovation came to be "a core focus area for successful organizations" (Kirchmer, 2015, p. 84). To this author, organizations need and must participate in business process innovations on a daily basis in an attempt to ensure their survival in the market and manage their business processes to support and propel innovation.

Examples that corroborate this include Dell, bearing in mind that it did not create the PC, but did create new business processes that enabled PCs to enter the market. Dell eliminated unnecessary stages from its supply chain, allowing customers to have the product they desired according to their own specifications. Process innovation was the basis for the growth of the company.

Amazon.com did not invent books, but introduced a process that popularized the purchase of books online. This is a process innovation based on the internet and its new technical capabilities. eBay did not invent auctions, but its way of auctioning enabled easily used processes to increase the popularity of auctions. When analyzing initiatives in terms of process, Harmon (2015) states that after realizing that innovation is generally a synonym for process or product changes, all a company has to do is determine the right mix for its purposes. The author also states that it is important for entrepreneurs to be aware of what is involved in the field of innovation and what can actually be used by their companies.

They have to be careful to avoid being carried away by spurious correlations that always seem to emerge in the wake of new business jargon. The main conclusion that can be drawn from the studies of Harmon (2015) is that if the top management wishes to speak about innovation, the professionals involved in processes must be prepared to make innovation happen.

Summary of The Literature

To enable a better understanding of the elements that allow a case study to be analyzed in the light of the literature, in Table 3 the main

authors and aspects in question are presented, with the objectives with which they are associated. By adopting the presented theoretical basis, the intention is to confirm that changes and innovation processes occur in a continuum, i.e., in both directions and concomitantly.

Table 3: Theoretical basis of the study regarding process innovation.

Authors	Elements of the theory	Objectives
Un & Asakawa (2015)	Conceptual aspects of process innovation Characteristics of Exploitation	To characterize process innovation
Suárez-Barraza (2013)	Implication of process innovations	To identify possible results of process innovations
O'Reilly & Tushman (2004)	Types of innovation	To identify incremental, architectural and discontinuous innovation
Harmon (2015)	Process innovation continuum	To identify and classify process innovations in accompany using the continuum model

Source: Prepared by the authors.

The methodological aspects of the study are presented below.

METHOD

The present study uses an exploratory approach (Marconi & Lakatos, 2011), as the intention is to familiarize readers with the theme of process innovation, especially considering the frontiers of knowledge. The study is qualitative in nature, as this method is ideal for conducting an analysis, interpreting and describing the phenomena in question (Marconi & Lakatos, 2011).

The research strategies were bibliographic research and the case study (Martins & Theóphilo, 2009). The single case study was adopted as this was considered a unique case (Yin, 2010) for investigating the phenomenon, in a context that has not been widely explored in the literature, as it is difficult to find scientific information on the surfing market and its management (Carvalho & Mondo, 2010; Serra, 2017).

The unit of analysis was a company in the surf market called Tropical Brasil (TB). The process of selecting this organization was symbiotic. It was easy for the researchers to gain access to the information and it was perceived that a scientific analysis of the company and its

history of innovations would provide evidence of decisions regarding the future of the business.

Multiple sources were used to collect the data and evidence (Yin, 2010; Serra & Ferreira, 2016) that would permit an analysis of the phenomenon at TB. A source of primary data was an unstructured interview with Avelino Bastos (AB), a founding partner of the company, and Nelson Mendes (NM), the partner responsible of operations and market relations. The purpose of these interviews was to obtain information, data, opinions and evidence through an open conversation (Martins & Theóphilo, 2009). The interviews were based on a script that could help to guide them but without losing the flow of conversation, with the formulation of elements that allowed the researcher to interpret the responses without any bias. The interviews were recorded and transcribed. The secondary data were made up of documents (advertisements, proposals, reports, e-mails and other internal documents) and filed records (statistical data for public use and records such as service orders and budgets). Data were also retrieved from a previously published case study of the company (Serra, Fiates & Alperstedt, 2007). These instruments and techniques allowed the integration of multiple sources of data, which

converged through triangulation, constituting a data analysis strategy (Yin, 2010; Martins & Theóphilo, 2009; Serra & Ferreira, 2016). Concerning the data analysis, the data were reduced, presented and outlined to reach conclusions (Martins & Theóphilo, 2009). A general case description strategy was used to aid the development of a descriptive analytical structure to organize the case study (Yin, 2010). Finally, the analytical technique of pattern matching was used (Yin, 2010), comparing the procedures adopted for the case in question and the conceptual basis regarding process innovation.

RESULTS

The results will be described considering the mix of information obtained from the interviews with the partners and the data from the previously published cases study on the company (Serra et al., 2007). To facilitate the description of the behavior of TB regarding the analysis of its innovations, the authors present the findings using the same logic employed in the literature review: characterization of process innovations, the implications of these for the business and, finally, adaptation of the continuum proposed by Harmon (2015).

Characterization of The Market and The Company

In a systematic review of the literature on surfing, Novack and Osiecki (2014) found that there had been a significant rise in the number of people who practice the sport in recent times. Based on the report published by the International Surfing Association, the authors found that there are approximately 35,000,000 surfers in the world, while in Brazil there are an estimated 2.5 million. In economic terms, the Brazilian Surf Institute (IBRASURF) found that the international surf market achieved a turnover of more than twenty billion dollars in 2010, while in Brazil the turnover was approximately seven billion reais (IBRASURF, 2010).

The study by Novack and Osiecki (2014) also found that, in addition to the increasing popularity of the sport, it had also evolved technically in terms of the development and

production of surfboards. Four hundred and fifty years ago, the Peruvians surfed on boards made from straw and raffia, while the Hawaiians surfed on wooden boards. In 1920, wood was the ideal raw material for American surfboards. In the 1950s, laboratory research led to the making of the first polyurethane surfboards. Nowadays, surfboards are made from polystyrene foam and epoxy resin (Almeida et al., 2012). In addition to describing the changes in the manufacturing of surfboards, these authors found that the evolution of this kind of equipment shows that the sport has undergone modernization and technological growth that keep up with social trends by seeking to build sustainable equipment.

Despite the growth in the industry, in Brazil, many surfboards are handcrafted and the market is an informal one, with knowledge generally gained through practice. This sort of production produces 60 to 100 boards on demand. On an industrial scale, a Brazilian company manufactures an average of 200 to 500 boards a month. In China, a factory produces up to 1200 boards per month (Mathias, 2014). The Brazilian industry has approximately 600 manufacturers producing around fifty thousand boards a year (Souza et al., 2010)

Surfboards can be produced in two ways: (i) they can be handcrafted by professionals known as shapers, a process that is long and involves problems with symmetry and repetitiveness or (ii) automatically, by milling machines, which minimize the problems but are expensive to acquire (Gesser, Pozzobon, Silva & Bonacorso, 2007). The company in question became operational in 1981, employing manual techniques. Since then, given the expanding market, the founding partner has invested in automation and precision technology to maintain a quality product on a large scale, which enables him to supply his boards to multiple-brand stores in Brazil, Europe and Japan. Tropical Brasil (TB) is a company with 100% Brazilian capital, located in Santa Catarina State. Its main activity is the manufacture and sale of surfing products (boards, equipment and clothing). Since its foundation, the company has seen several changes in its partners. The founder, Avelino Bastos (AB), has worked with renowned surfing professionals as his partners. Today, his partner is Nelson Mendes (NM), who is in charge of operations and market relations, while Avelino

Bastos works directly with innovations for the company's products. In April of 2012, the Eixo Group acquired the clothing and accessories divisions of TB, and Avelino Bastos remained in charge of the surfboard production unit. Today, the company has 15 employees. According to the classification of the National Economic and Social Development Bank (BNDES) (2015), TB is a micro business, with a top-level gross operational turnover, i.e., up to 2.4 million reais.

Process Innovation and Its Implications

Although product innovations appear more frequently on the market, TB has also innovated its processes and services. However, this study analyzes only the process innovations of the company since its foundation, as described in Table 4.

Table 4: Process innovations by TB.

	Innovation	Year	Objective	Type of innovation	Result of the innovation
1	Mechanization of shape.	1988/1992	To increase productivity.	Architectural	Adoption of new technologies that change a component or element of the business
2	Industrial process for producing customized surfboards	1997	To increase productivity due to the production line. This process enables the shape and surface to be customized, but uses the same manufacturing process.	Architectural	Small product improvements. Small improvements to existing operations. Adoption of new technologies that changed a component or element of the business.
3	System for managing manufacturing orders.	2010	To save time and human and physical resources.	Incremental	Small improvements to existing operations.
4	Development of product catalogue offering customized surfboards for different profiles.	2011	To manage production and stock better and facilitate sales by offering products that are more adapted to the profile.	Incremental	Small improvements to existing operations.
5	Development of a shaping machine (three-dimensional CNC with CAD/CAM) that enables production of stand-up paddle boards.	2011/2014	To increase productivity and accuracy and enable the use of other raw materials for the development of new products.	Architectural	Small improvements to products. Small improvements to existing operations. Adoption of new processes that changed a component or element of the business.
6	Partial or total elimination of the painting of boards with the development of silk-screen printing.	2012	To increase productivity and simplify operations through cost reduction and the elimination of a bottleneck.	Architectural	Small improvements to products. Small improvements to existing operations.

					Adoption of new technologies that fundamentally changed a component or element of the business.
7	Development of a tracing table for prototypes of the new shaping machine	2013	To achieve a faster and more accurate process.	Architectural	Small improvements to products Adoption of new technologies that changed a component or element of the business.
8	Development of shaping machine software.	2013	To increase the speed and precision of the process.	Incremental	Small improvements to existing operations.
9	Implementation of e-commerce platform.	2013	To expand the consumer market and reduce courses with intermediaries.	Architectural	Adoption of new technologies that changed a component or element of the business.
10	Development of a technical services sector for main customers.	2014	To improve the perceived quality of customer service.	Incremental	Small improvements to existing operations.

Source: Based on Serra et al. (2007) and complemented by the authors.

Table 4 shows that in 34 years, there were ten significant process innovations. According to the categorization proposed by O'Reilly and Tushman (2004), four were incremental and were related to process improvements, and six were architectural and had to do with redesigning processes. No discontinuous innovations were reported. According to the interviewees, some of these innovations were not exclusively architectural, as they resulted in only small improvements to products and operations, with simultaneous changes in business components (Innovations 2, 5, 6 and 7 in Table 4). Regarding the implications of these innovations, the data show that, if the sum of the incremental and architectural innovations is considered, the most evident are: (i) operational cost reductions (9 citations); (ii) supply of mechanisms to locate, prevent or solve problems (8 citations); and (iii) reduce time spent on processes (8 citations). Operational cost reduction was first place for both incremental innovations (3 citations) and architectural innovations (6 citations).

According to AB, irrespective of innovations having become popularized in discussions on the success of the business, his company has always sought to solve the

problems and face the challenges that arose, whether internal or external, as were most in his opinion. One of his main concerns has always been to improve the means of producing surfboards, with the least possible effort, the most quickly and in the highest possible number to meet the growing demand from the market. This intention can especially be seen in Innovations 1, 2, 5, 6, 7 and 8 (Table 4). In the search for solutions to improve his products, AB traveled abroad to visit other surfing equipment factories and discovered that there were no great solutions out there. Therefore, he decided to seek solutions in other markets that might help to develop his products, like the automobile, furniture and marine industry. He found that to make his product innovations feasible, he would need to adapt his processes. He took some initiatives, such as: (i) studying automation to develop his own shaping machine to substitute the handicraft techniques, increase productivity and improve quality (Innovation 5); (ii) hiring more people and training them to operate the production line as intended by the designer; (iii) increasing the number of suppliers of raw material and equipment; (iv) seeking more efficient ways to publicize his products to the end

consumer and major customers (Innovations 4, 9 and 10); and (iv) hiring the services of a consultancy to improve the management of his business and creating innovations, such as number 3 (system for managing orders), which reduced the delivery time of the product from 60 (when control was registered in a notebook) to 15 days. Regarding the use of the shaping machine, the interviewees reported that the technological innovation it enabled was the creation of new processes. These included training employees to operate it and adapting skills, as the employees ceased to be artisans and became machine operators and technicians in charge.

The new equipment meant that cheaper and more sophisticated materials could be used. The traditional suppliers were replaced by new ones with more sustainable materials and materials that were less harmful to human health, such as Styrofoam. Furthermore, surfboard development was no longer dependent on the talent of a single shaper (AB), who was fully aware that in the long term, the natural ageing process or possible injuries from repetitive actions, would limit his capacity to produce. The set of process innovations accompanied by accumulated knowledge allowed the company to expand its product lines by developing, for instance, a new type of board (stand-up paddle) to serve an emerging market located in the interior of the country that was not dependent on seasonality. In general, some decisions to innovate were responses to external pressures, such as the growth of the surf market and the entry of international brands with their high-quality equipment. Other decisions resulted from the company's own culture, a consequence of the entrepreneurial profile of its founding partner.

A further example of this creative behavior was that the shaping room was recently replaced by a large shed to allow more space for new product and process development. The process innovations of the company were mainly technological and focused on the development of equipment to improve productivity, costs and the precision of products. These innovations enabled the development of new products, such as other shapes of surfboards made of new materials. Other types of innovation altered the labor processes, like the printer that replaced the painters with workers with other skills.

It should be highlighted that, structurally, the partners have always had their own functions. AB is responsible for innovations, while NM is in charge of routines and operations. To AB, innovation is the *raison d'être* of the company and what determines its path. For TB, innovation is everything that makes something better, more useful, more pleasant and more durable. In this sense, the company is continually rethinking how to do things, proposing improvements, analyzing errors and problems. Basically, two factors keep the company from being more dedicated to innovation: (i) the conservative nature of the product distribution network and (ii) financial limitations on systematic investments in research and development. The conservative behavior of the market may be one of the reasons why one of the partners is concerned with maintaining a certain tradition, despite the innovations.

DISCUSSION

The result of the case of TB allowed an analysis of real experiences through the lens of the theories selected for conducting this study. Using the structure proposed in Table 3 (theoretical basis of the study), the results obtained will be compared with the theories of Un and Asakawa (2015), Suárez-Barraza (2013), O'Reilly and Tushman (2004) and Harmon (2015).

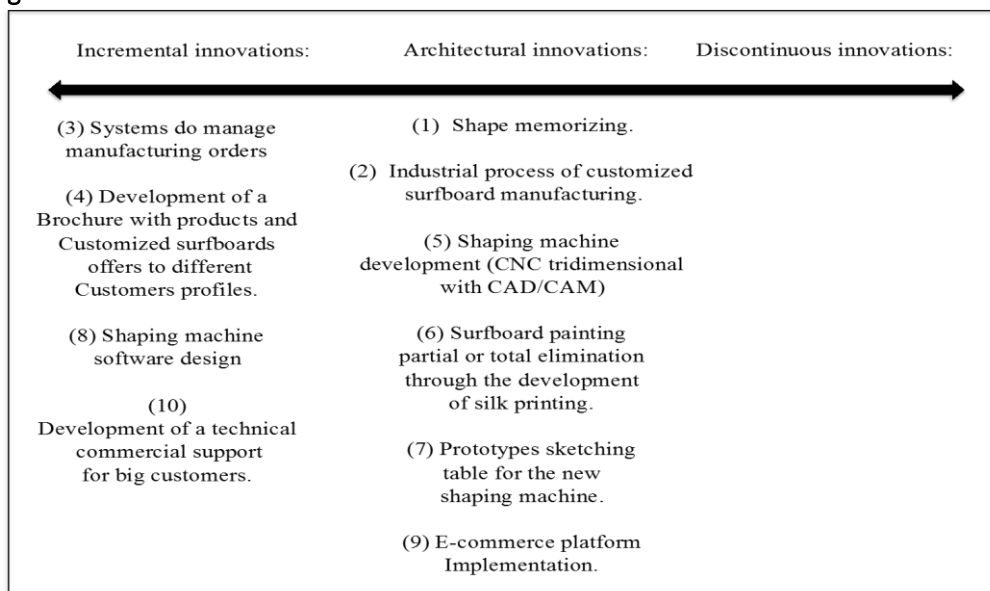
Regarding the degree of novelty concerning the process innovations of the company, 100% sought to increase efficiency, reduce costs, improve internal practices and deploy exploitation strategies, and occurred in the organizational environment. This corroborates the findings of Damanpour et al. (2009), Davenport, (1993), Hamel (2006) and Un and Asakawa (2015), when they discussed the characteristics of this type of innovation, differentiating it from product innovations. The process innovations of TB were sometimes found to occur in virtue of the product innovations, such as the incorporation of the clothing line that was later sold to another group. On other occasions, these enabled the product innovations, such as the range of opportunities provided by the shaping machine. This mutual impact confirms the findings of Damanpour and Costa et al. (2016), Gopalakrishnan (2001), Piening and Salge (2014), Reichstein and Salter (2006) and Ettl

and Reza (1992) when they affirm that products and processes have related lifecycles and that it is not enough to innovate products. It is also necessary for processes to accompany these innovations. Regarding the implications of process innovations, in accordance with the study of Suárez-Barraza (2013), practically all of them were identified, but the following may be highlighted: operational cost reductions; locating, solving and preventing problems or errors at work; and reduction in time spent on processes. These results are in keeping with the findings of Davenport (1993) and Damapour, Walker and Avellaneda (2009), respectively regarding the creation of competitive advantages by reducing costs and focusing on the company's internal processes. As for the difficulties, it can be assumed that, given the size of the company, the organizational structure and managerial support do not constitute a difficulty. This is contrary to the findings of Choi and Chang (2009) and Douglas and Judge (2001). Furthermore, the clear division of tasks by the partners tends to avoid conflicts of interest.

When one of the partners is dedicated to innovations, of both products and processes, and the other is dedicated to the operational routine,

it is possible to see benefits resulting from ambidextrous behavior (O'Reilly & Tushman, 2004), obviously on a smaller scale, as here the individual level is considered rather than independent units. As there is cohesion and recognition of the importance of having adequate processes to enable other types of innovation, the partners do not classify the difficulty of measuring the results of process innovations as a hindrance, which is not in agreement with the literature (Ayhan et al., 2013; Edmonson et al., 2010; McNulty & Ferlie, 2004). It is likely that the greatest difficulty for the company is the financial limitations that prevent greater investment in research and development (Klein et al. 2001; Ferreira, Serra & Maccari, 2012). Studying the innovations of TB since the company was founded showed the assumptions of Harmon (2015) being put into practice, when he points out that the distinction between innovations is not as important as the real intention of companies that continuously seek new ways to do things. Figure 2 shows that this type of behavior can be identified in the company, as throughout its 34 years some of the innovations resulted in improved processes, while others resulted in redesigning of processes or even both.

Figure 2: Process innovation continuum of TB.



Source: Prepared by the authors based on field research and Harmon (2015).

As shown in Figure 2, the ten process innovations at TB in the innovation continuum are concentrated in incremental and architectural innovations. These innovations, as

previously mentioned, affected one another and many of them occurred concomitantly, corroborating the rereading of the Map of Innovation proposed by Harmon (2015), which

culminated in his renaming it the Innovation Continuum. Irrespective of the reason for the growth in innovations, external demand or own initiative, there was a combined investment in different types of innovation without specific concern over their category, as the intention was to create value for the customer and maintain the financial health of the company. The initiative taken by TB infer that the partners are concerned at the macro level and that in addition to timely innovations, they consider the set of structure and related activities, the business processes. The balance between the number of incremental and radical innovations by TB is yet another indication that innovations co-occur (Harmon, 2015; O'Reilly & Tushman, 2004).

The point of view of AB also deserves to be highlighted when he claims that innovations are everything that makes things better, more useful, more pleasant, and more durable, and that TB is constantly rethinking how to do things, proposing improvements and analyzing errors and problems. Therefore, it is possible to identify both the simultaneous nature of innovations proposed by O'Reilly and Tushman (2004) on their Map of Innovation and the Innovation Continuum proposed by Harmon (2015), who claims that several innovations can occur at the same time in any direction. It is important to emphasize that any type of innovation, be it in products or services, will require a change in business processes. The wealth of experience of TB in the manufacturing of surfboards shows the importance of process innovations to ensure the survival of the business in the market, as the company has shifted from handcraft to a type of scale manufacturing.

This enabled it to increase its presence on the market, corroborating the findings of Kirchmer (2015), highlighting the importance of this type of innovation in the experience of successful companies. It should be highlighted that, given the manufacturing nature of TB, the analysis that afforded a glimpse of the results of process innovations on the results of the business was facilitated by the fact that TB produces tangible products. It is likely that the results would not be so evident when dealing with a company that delivers solutions.

The analysis of the results also suggested that, given the nature of the product and industry (non-technology based), it would be more

difficult to characterize an innovation as discontinuous. It should also be emphasized that the management consultancy that was hired supplies one of the capabilities not worked on by the company because, by identifying problems and suggesting changes, it helps to resolve the business results, even though they have little impact on the result of the products or services.

Therefore, with regard to the research question (*How are process innovations conducted by a Brazilian surfing equipment manufacturer?*), it can be seen that the top management of the company perceived, albeit unconsciously, that innovation is a synonym for change, sometimes incremental, on other occasions architectural. The change can affect the product, the process or both. In this sense, they work to achieve an adequate and integrated combination to improve the business results. This supports the main conclusion reached by Harmon (2015), when discussing the continuum of innovation possibilities and the importance of changes in the process to bolster changes to the business.

This study contributes to the discussions on process innovations. This is because what might at first glance appear to be a jumble of concepts is actually a reflection of the magnitude of the use of processes in organizations, irrespective of whether they are private, public, philanthropic or informal.

Although it may seem to be bureaucratic, the perspective of processes in organizations enables the systematization and integration of the most diverse areas, improving the flow of activities. Given the constant and new requirements of the market and with the intention of maintaining healthy businesses, organizations have embraced the need for constant innovation.

The focus is normally on the innovation of products or services that generate direct financial results, thus facilitating the tangibility of the benefits of innovation. However, this is a view that does not consider the precedents of the production chain.

The study of TB has shown that in practice it makes sense to view process innovations as a source of competitive advantage, as they can lead to savings in terms of cost and enable the launching of new products, services and even new businesses.

FINAL CONSIDERATIONS

Despite receiving little attention in the literature, the study of process innovations has gained importance over the years. New research has sought to understand and highlight the importance of the theme both academically and practically, as process innovations can help companies achieve positive results that may affect their businesses. Researchers have sought to find new theories and reinterpret existing theories to remain within the frontiers of knowledge. In the case of process innovations, this constant search is shown in the model of the Innovation Continuum proposed by Harmon (2015), with a rereading of the Map of Innovation proposed by O'Reilly and Tushman (2004). This rereading highlights that irrespective of the type of innovation, a process innovation can occur at any time and simultaneously, affecting and being affected by another innovation, continuously and without interruption. It is clear that the model of Harmon (2015) lacks empirical studies to prove its validity and reliability. However, this article is a first attempt to validate the model, highlighting its theoretical contribution of the field of innovation. A limitation of the present study is that it is a single case study conducted in a specific sector, without extrapolation to other economic sectors. Furthermore, only the managers of TB were interviewed. A suggestion for future studies would be to conduct new empirical research at other companies, including technology-based companies using qualitative and quantitative approaches to gauge whether the innovation continuum has the same characteristics or whether other elements deserve consideration.

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