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CUMULATIVE LEARNING AS AN INNOVATION SOURCE: THE CASE OF A LARGE COMPANY IN THE COSMETICS, TOILETRY AND FRAGRANCE INDUSTRY IN BRAZIL

APRENDIZAGEM CUMULATIVA COMO FONTE DE INOVAÇÃO: O CASO DE UMA GRANDE EMPRESA DO SETOR DE HIGIENE PESSOAL, PERFUMARIA E COSMÉTICOS NO BRASIL

EL APRENDIZAJE ACUMULATIVO COMO FUENTE DE INNOVACIÓN: EL CASO DE UNA GRAN EMPRESA DEL SECTOR DE LA HIGIENE PERSONAL, LA PERFUMERÍA Y LA COSMÉTICOS EN BRASIL

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Abstract

Objective of the study: To identify and analyze the evidence of the learning processes such as "learn by doing", "learn by usage" and "learn by interacting" as a source of innovation in a large company in the Cosmetics, Toiletry and Fragrance Industry (CTF) within Brazil.

Methodology/approach: A qualitative study was carried out, using a data collection procedure based on interviews with employees of a large company in the CTF industry within Brazil.

Originality/Relevance: A company that seeks innovation is not restricted solely by Research and Development (R&D), but must also consider, as a source of innovation, the continuous learning by its internal and external environment which provides it with a tacit knowledge that differentiates it from its competitors. Despite the CTF sector being one of the most important in the world, with Brazil being one of its biggest players, there is a lack of published articles for this sector, which address the issues of the learning process as a source of innovation.

Main results: The results show the existence of the learning process as a source of innovation in formal and informal routines, especially for "learning by interacting", in generating pioneering innovations in the selected company.

Theoretical/methodological contributions: Discuss and demonstrate the role of cumulative learning as a source of innovation for companies.

Social contributions / for management: It is hoped that this study will motivate future studies in the pursuit to highlight the role of cumulative learning in generating innovation in companies.

Keywords: Cumulative learning. Innovation. Neo-Schumpeterian theory. Cosmetics. Toiletry and Fragrance Industry (CTF) in Brazil.

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Resumo

Objetivo do estudo: Identificar e analisar as evidências do processo de aprendizagem dos tipos "aprender fazendo", "aprender usando" e "aprender interagindo" como fonte de inovação numa grande empresa do setor de Higiene Pessoal, Perfumaria e Cosméticos (HPPC) no Brasil.
Metodologia/abordagem: Foi realizado um estudo de natureza qualitativa com abordagem exploratória, tendo como procedimento de coleta de dados entrevistas com profissionais de uma grande empresa do setor de HPPC no Brasil.
Originalidade/Relevância: Uma empresa que busca inovação não se restringe apenas à área de Pesquisa e Desenvolvimento (P&D), mas também deve considerar, como fonte de inovação, o aprendizado contínuo do seu ambiente interno e externo que lhe proporciona um conhecimento tácito que a diferencia de seus concorrentes. Apesar do setor de HPPC ser um dos mais importantes do Mundo, sendo o Brasil um dos seus maiores players, há uma escassez de artigos publicados para este setor que aborde as questões do processo de aprendizagem como fonte de inovação.
Principais resultados: Os resultados evidenciam a existência do processo de aprendizagem como fonte de inovação em rotinas formais e informais, especialmente para o tipo de aprendizado "aprender interagindo" na geração de inovações pioneiras na empresa selecionada.
Contribuições teóricas/metodológicas: Discutir e evidenciar o papel da aprendizagem cumulativa como fonte de inovação para as empresas.
Contribuições sociais / para a gestão: Espera-se que esta investigação motive que futuros trabalhos busquem evidenciar o papel da aprendizagem cumulativa na geração de inovações nas empresas.

Palavras-chave: Aprendizagem cumulativa. Inovação. Teoria neoschumpteriana. Setor de higiene pessoal. Perfumaria e cosméticos (HPPC) no Brasil.

Resumen

Objetivo del estudio: Identificar y analizar las evidencias del proceso de aprendizaje de los tipos "aprender haciendo", "aprender usando" y "aprender interactuando" como fuente de innovación en una gran empresa del sector de Higiene Personal, Perfumería y Cosméticos (HPPC) en Brasil.
Metodología/Enfoque: Se realizó un estudio cualitativo con enfoque exploratorio, teniendo como procedimiento de recolección de datos entrevistas con profesionales de una gran empresa del sector de HPPC en Brasil.
Originalidad/Relevancia: Una empresa que busca la innovación no se limita sólo al área de Investigación y Desarrollo (I&D), sino que también debe considerar, como fuente de innovación, el aprendizaje continuo de su entorno interno y externo que le proporciona un conocimiento tácito que la diferencia de sus competidores. A pesar de que el sector de la HPPC es uno de los más importantes del mundo, siendo Brasil uno de sus principales actores, hay una escasez de artículos publicados para este sector que aborden las cuestiones del proceso de aprendizaje como fuente de innovación.
Principales resultados: Los resultados evidencian la existencia del proceso de aprendizaje como fuente de innovación en las rutinas formales e informales, especialmente para el tipo de aprendizaje "aprender interactuando" en la generación de innovaciones pioneras en la empresa seleccionada.
Aportes teóricos/metodológicos: Discutir y destacar el papel del aprendizaje acumulativo como fuente de innovación para las empresas.
Contribuciones sociales/gestión: Se espera que esta investigación motive futuros trabajos que busquen evidenciar el papel del aprendizaje acumulativo en la generación de innovaciones en las empresas.

Palabras clave: Aprendizaje acumulativo. Innovación. Teoría neoschumpteriana. Sector de la Higiene Personal. Perfumería y Cosméticos (HPPC) en Brasil.

1 Introduction

Studies on innovation begin principally with the works of Joseph Alois Schumpeter, which gave a greater importance to the role of innovation in the industrial dynamics of

companies. However, it was only after the 1970s, Freeman (1974) and Nelson and Winter (1982) resume Schumpeterian ideas and propose a new evolutionary theory of economic change.

The importance of studying learning processes is justified once such processes can be considered one of the main sources of innovation for companies. This learning would mainly take place based on the routines and the experiments/trials which accumulate over time, producing new ideas, products and processes for the development of companies (Lundvall, 2016, Malerba & Pisano, 2019)

The literature on this subject has a considerable conceptual approach regarding organizational routines in the learning process, however operational content and empirical measurements are still lacking so as to validate the theoretical construction (Demircioglu, Audretsch & Slaper, 2019, J. Guo, B. Guo, Zhou & Wu, 2020). So as to fill this empirical void and contribute to the literature, for a better understanding of organizational routines, this article highlights the characteristics of the learning process as a source of innovation in a multinational company in the TPC sector in Brazil.

The essential idea here is that learning takes a specific form as a source of innovation in the company, through a cumulative and incremental process of problem solving, which would culminate in the improvement of its products and processes. The result of this learning process, as a company-specific source of innovation in production, is the creation of tacit capacity, or corporate technological competence, which requires the accumulation of specific knowledge about its business.

Learning manifests itself within the social relationships between economic agents and organizational structures regarding firms. The way an organization is structured, and the routines followed will have a big effect on the rate of learning that takes place. The appropriate institutional framework can either improve or accelerate the production of knowledge in terms of building skills based on daily activities. (Lundvall, Jensen, Johnson, & Lorenz, 2016).

Thus, the main objective of this study is to identify and analyze the evidence of the learning process in companies, as a source of innovation, taking as a baseline, as a qualitative based study with an exploratory approach, a large company in the Cosmetics, Toiletry and Fragrance Industry (CTF) in Brazil. Based on interview guidelines with those responsible for innovation, within the chosen company, we will analyze the main practical types of learning, that make up the innovative process in companies, such as “learn by doing”, “learn by usage” and “learn by interacting”.

In this article, we attach great value that the experience and practice of organizational activities provide a potential effect on the generation of innovations. More specifically, we highlight, that amongst the main types of learning within a company, the routine activities of economic agents produce specific knowledge in companies' that feed this back into the innovative process.

The choice of the TPC sector in Brazil is due to some unique characteristics of this sector. Firstly, due to the high diversity between companies and its representativeness in the Brazilian and world economy. According to AHIPEC (2020), the TPC sector in Brazil is quite representative in the world, being ranked 4th in the world market in 2019.[1] Secondly, due to its competitive characteristic given the differentiation between companies, according mainly to their size, age, productivity and investment patterns, innovative activities and the innovative characteristics of their products and processes in order to meet consumer needs, in a customized way, according to their age, gender and ethnicity. And finally, due to the strong presence of the main multinational companies in this sector, such as Unilever, Procter & Gamble, L´Oreal and Estee Lauder. In Brazil, the national companies, Natura and O Boticário are also represented.

Section 1 corresponds to the literature review which introduces the concepts of the learning process in the industrial dynamics of companies, in an evolutionary view, based on the neo-Schumpeterian theory. Section 2 refers to the methodology that shows how the data was obtained through interviews with those responsible for the innovation process in a large company within the TPC sector in Brazil. Section 3 is intended to present the research results that will be discussed based on the concepts highlighted within the theoretical framework. Finally, we present the conclusions for this article.

2 Literature review

2.1 Evolutionary economics and the innovation process

Evolutionary economics is present in the works of one of the main economists of the 20th century, Joseph Alois Schumpeter.[2] According to Schumpeter (1982), the fundamental phenomenon of economic development is economic change promoted by the producer through innovations. The author does not disregard the nexus that exists between the innovations demanded by consumers, however re-affirms that "it is the producer who, as a rule, initiates

[1] Based on the L'Oreal 2019 Yearbook, the global cosmetics markets was estimated to be worth €220 billion (L'Oreal, 2019)

[2] Authors who seek in Schumpeter's works new insights for the analysis of economic phenomena, classified Schumpeter's theory into "Schumpeter Mark I" and "Schumpeter Mark II". "Schumpeter Mark I" is based on the publication "Theory of Economic Development 1911, (English version published in 1934), "Schumpeter Mark II" is based on the publication "Capitalism, Socialism and Democracy" 1942 (Dosi, Malerba, Marsili. & Orsenigo, 1997, Malerba & Pisano, 2019).

economic change, and consumers are educated by him if necessary; they are, so to speak, taught to want new things, or things that differ in one respect or another from those they were in the habit of using" (Schumpeter, 1982, p. 48).

Authors who followed these ideas were known as neo-Schumpeterians and, amongst them, the evolutionary approach to economics stands out. Begun mainly as from the 1970s, studies by Freeman (1974) Nelson e Winter (1982), Rosemberg (1982), Tecee, (1986) and Dosi, Silverberg, and Orsenigo (1988), these authors gave new meanings, theoretical and practical insights into this aspect of heterodox economics. In this evolutionary vision, the company promotes economic development interacting with the growth of the markets. In this perspective, the company is an instrument for the establishment of locally specific productive or technological skills and also for their continued development over time. The company becomes a repository of productive skills or knowledge and an institutional instrument for their learning and accumulation (Winter, 1988).

Proficiency or capability gradually evolves within the production processes of established companies, even as markets and products themselves change drastically throughout historical periods and influence the direction taken by companies. Thereby, the company provides elements of institutional continuity over time, in its role as a repository of specific domains of competency that are important for the creation of innovations (Cantwell & Fai, 1999).

For Nelson and Kim (2005), "innovation is defined as a precursor activity, originally routed in the company's internal competencies, so as to develop and introduce a new product to the market for the first time" (Nelson & Kim, 2005, p. 16). The definition of innovation can also be defined based on the Oslo Manual (Organization for Economic Co-operation and Development) [OCDE], 2018), which is a world reference in the application of economic research with the objective of analyzing the variables that correspond to an innovation. This manual is even used in Brazil for the national innovation survey – (Pintec [IBGE], 2017).

According to the Oslo Manual, innovation can be described as follows:

> Innovation is more than a new idea or an invention. An innovation requires implementation, either by being put into active use or by being made available for use by other parties, firms, individuals, or organizations. The economic and social impacts of inventions and ideas depend on the diffusion and uptake of related innovations. Furthermore, innovation is a dynamic and pervasive activity that occurs in all sectors of an economy; it is not the sole prerogative of the Business enterprise sector. Other types of organizations, as well as individuals, frequently make changes to products or processes and produce, collect, and distribute new knowledge of relevance to innovation. (Organization for Economic Co-operation and Development [OECD], 2018, p. 44).

Freeman (1988) suggested a taxonomy of the innovations divided in 4 major groups: (1) incremental innovations; (2) radical innovations; (3) changes in the technological system and e (4) changes in the tecno-economic paradigm. Incremental Innovations occur continuously in companies depending on the type of industry, country, technology, and socio-cultural factors. They are generally the result of daily improvements and modifications not only of Research and Development but of innovations and improvements suggested by engineers in the production process or even suggested by consumers; Radical Innovations are discontinuous in product and process technology, being the result of deliberate activities by the Research and Development team and/or university's or government laboratories; Changes in the technological system are sweeping changes in technology that generate entirely new sectors of the economy; Changes in the tecno-economic paradigm are also sweeping changes in technology which have the greatest influences on the behaviour of the entire economy. The greatest characteristic of this is the pervasive effect on the whole economy.

In this way, the process of innovation can be described as an interactive learning process by which those involved increase their competency while engaging in the innovation process (Lundvall, Jensen, Johnson, & Lorenz, 2016). Companies use different sources and methods to enable the creation of innovation. Different innovation sources, internal and/or external to the company, are used according to their and strategic objectives. Internal sources of innovation involve, for example, the company's internal activities such as Research and Development activities – internal R&D, tacit knowledge (acquired during the company's productive lifespan), personnel training and organizational learning. External sources of innovation refer, for example, to paid R&D, codified knowledge (manuals, technical magazines etc.), specialized consultancy, cooperation with customers and suppliers, licensing for the manufacture of products and the purchase of machinery and equipment.

However, in this article, we highlight the role of one of the main sources of innovation in companies, which is cumulative learning. This source of innovation stands out for having internal and external characteristics that promote the generation of innovation in companies (Lundvall, 2016, Malerba & Pisano, 2019). In the next topic, we will delve deeper into the concepts of cumulative learning, highlighting the principal concepts categories for analysis.

2.2 Cumulative learning and forms of learning

Cumulative learning refers to the company's specific cumulative process, provided by its productive development, using internal and/or external sources of innovation (Cantwell & Fai, 1999).

> Hence, appreciating that innovation is a collective learning process organized by firms helps to resolve the old debate over whether the essential source of technological change is science or research-push (sometimes called technology-push by those using the old narrower `engineering' or `blueprint' definition of technology) or demand-pull (Mowery & Rosenberg, 1979). Innovative learning instead gathers a certain cumulative and incremental logic of its own, which interacts with but is not driven by the development of either science or market demand, as argued similarly by Clark (1985). Technology affects science and demand as much as the other way round. (Cantwell & Fai, 1999, p. 339).

Technological competency is the result of long-term learning processes, with interaction between internal and external contributions, such as, tacit knowledge and cooperation respectively.

> The outcome of this firm specific learning process in production is the creation of tacit capability or corporate technological competence, that requires the generation of specially tailored knowledge inputs, the composition of which inputs reflects the company's distinctive fields of technological specialization and the focus of its learning activity. (Cantwell & Fai, 1999, p. 332).

Malerba (1992) starts off with the idea from several empirical studies already carried out on the importance of cumulative learning in the accomplishment of companies. Initial studies analyze the "*Learning curve*" and the "*Learning by doing*" so as to verify the impact of learning on the growth of production and on the development of companies based on the experience of production.

Based on this empirical tradition (in investigating economic reality) and theoretical tradition (in the sense of formulating explanatory models), some authors analyzed the contributions of learning in the propagation/dissemination of the innovation process in companies. Thus, "*Learning by using*" is highlighted in the analysis of productive efficiency gains that occur from the use of new products by its users (Dosi, Silverberg, & Orsenigo, 1988). Some authors have interpreted R&D actions as a process of "*Learning by searching*" (Nelson, Winter, 1982, Tecee, 1986, Dosi, Silverberg, & Orsenigo, 1988 as quoted in Malerba, 1992). Yet other authors investigate "*Learning by interaction*" by analyzing the interaction between the company and its respective suppliers and consumers (Lundvall, 1988, Malerba, 1992).

In view of this, the ways of learning in the company can be classified into the categories of internal and external learning. According to Malerba (1992), internal learning is made up of "learning by doing, "learning by usage" and "learning by seeking" which configure themselves

in activities related to R&D, production, marketing and organizational. External learning, on the other hand, is made up of "learning by the advances in science and technology", "learning from inter industry repercussions" and "learning by interaction" that contributes to the innovation process by expanding the company's rate of knowledge in cooperation with universities, research centres, suppliers, and end users.

Based on learning, companies develop an internal code containing information and knowledge about which routine should be followed in certain situations. There is the laying down of a set of routine operation information from which the company makes its decisions. This is what we call "tacit knowledge".

> The internal code introduces a notion of knowledge that is specific to the company. The so-called tacit knowledge may constitute an important part of the relevant knowledge. The term tacit knowledge is used to refer to concepts and information that are difficult or impossible to communicate (resulting from learning-by-doing processes, for instance): The transfer of routines and techniques from one company to another is not easily possible given tacit knowledge. (Elsner, Heinrich, & Schwardt, 2015, p. 388).

The way an organization is structured and the routines followed, impact the company's learning rate and promotes the development of new products and innovation performance. The result of this continuous process of company specific learning in production, generates the acquisition, assimilation, and integration of adequate and effective knowledge for innovation purposes, and allows the company to develop unique standards used in the innovative process, and that differentiates them from other companies in the sector (Guo et al., 2020).

Therefore, appropriate institutional structures can improve or accelerate the production of knowledge in terms of building competencies based on daily activities. The knowledge produced by the activities of formal and informal routines, through the learning process, tend to promote the innovative process in companies (Lundvall, 2016).

2.3 Formal and informal routines in the learning process as a source of innovation

The organization's competency resides in the accumulation of knowledge and organizational routines. "Most fundamentally, routines are the basis of the characterization of behavior continuity in our evolutionary theory: "routines as genes" is the catch phrase" (Nelson & Winter, 2002, p. 30).

The learning process as a source of innovation in companies allows for the continuous improvement of their products and processes, making them more competitive. In this way, this process is "fueled by internal and external factors of knowledge", of routines and experiences that accumulate throughout its development process with its interaction between different

institutions, and therefore, depend on a process of prior training (Malerba, 1992). According to the evolutionary approach to economics, companies that develop routines more suited to market conditions are more likely to succeed in competition with other competitors. However, as pondered by Elsner, Heinrich & Schwardt (2015):

> However, note that "better routines" does not imply "optimal routines." Firms pick the rules that seem best among those they know; at the same time, they can learn and find new ones. But they cannot constantly assess and change the rules they have decided on or do so abruptly for the whole set of rules characterizing them at any given moment. At any moment, the rules governing the decision-making in a company are the historically given set that has developed up to that moment: There is no reason to assume that they would be in any sense optimal for addressing current problems. (Elsner, Heinrich, & Schwardt, 2015, pp. 387-388).

In the competency based evolutionary view of the company, the main question is how companies develop their own internal organizational routines and partnerships between companies for technical cooperation, in order to improve their economic performance in a competitive market environment. Thereby, authors seek to demonstrate a greater importance of cumulative learning within the production processes of companies, as a determining factor for the innovation process, a learning that generates specific tacit capabilities, which makes companies stand out from each other (Cantwell & Fai, 1999, Teece as quoted in Nelson & Kim, 2005).

Production processes consist of activities within companies, such as, for example, "coordination/integration" in relationships with customers and suppliers and strategic alliances with other companies and "routinization" of organizational tasks through standardized procedures. There are also "learning" activities that are generated through a process of repetition and experimentation and "reconfiguration/transformation" activities, according to the need to make processes more flexible to carry out the necessary transformations based on the economic and competitive outlook/scenarios (Teece as quoted in Nelson & Kim, 2005).

Lundvall (2016) categorizes two perspectives of learning and innovation within the company – one category based on scientific knowledge and the other one based on knowledge through experience. Scientific knowledge manifests itself explicitly in the company from the codification of information needed by the company's production process. Yet knowledge through experience, on the other hand, is manifested implicitly in the company through the teachings of doing, using, and interacting in social relationships inside and outside of the company.

> This chapter is about the tension between two ideal type modes of learning and innovation. One mode is based on the production and use of codified scientific and technical knowledge namely Science, Technology and Innovation (STI) mode, while the other one is an experience- based mode of learning through Doing, Using and Interacting (DUI- mode). (Lundvall, 2016, p.155).

From this point of view, Lundvall (2016) argues that the *Science, Technology and Innovation - STI-mode* has a perspective focused on formal processes in the company, manifesting itself primarily through R&D activities. The experience-based learning mode *Doing, Using and Interacting - DUI- mode* has a perspective focused on learning from the informal interaction of people, inside and outside the organization, through tacit knowledge. "One perspective focusing on the role of formal processes of R&D that produce explicit and codified knowledge and another perspective focusing on the learning from informal interaction within and between organizations resulting in competence building often with tacit elements." (Lundvall, 2016, p.155)

The *Science, Technology and Innovation - STI-mode* also seeks insights and external sources of knowledge in its innovative process. However, throughout the process and especially its final result, documentation of the results is presented in a codified form. Policies, guidelines, scientific articles and patent applications require a formalization of the result to be achieved.

According to Arndt, Fourne, and MacInerney-May (2018), research in the German industrial sector indicates that the formal routine has a very positive performance in generating innovations with consistent results for learning through the codification, internalization and sharing of previous experiences.

However, for the *Doing, Using and Interacting - DUI- mode* there are many activities within the company that are resolved implicitly, that is, in the day-to-day workings. This kind of knowledge, regardless of the final coding degree, is largely acquired on the job, as employees face continual change that confronts them with new problems. Project teams, problem-solving groups, task and work rotation groups, which promote learning and knowledge exchanges, can positively contribute to innovation performance.

> Our results strongly suggest that firms with an exclusive focus on developing their science and technology base are foregoing important gains that could be reaped by adopting practices and measures designed to promote informal learning by using and doing. (Lundvall, 2016, p. 190).

In this way, the learning process is composed of formal and informal routines, at the company level, that are developed throughout the business activity. Formal routines that are characterized by institutionalized procedures and policies; and informal routines that occur as an unintended by-product of the company's design, production and marketing activities that

enhance learning through practice, use and interaction. Both routines – formal and informal – can contribute positively to innovation performance. (Lundvall, 2016)

Thus, the company can and should intentionally foster the construction of structures and relationships that use learning through practice, use and interaction. In particular, organizational practices such as project teams, problem solving groups, task and work rotational groups, which promote learning and knowledge exchange, can positively contribute to innovation performance.

3 General considerations about the Cosmetics, Toiletry and Fragrance Industry (CTF)

3.1 International scenario

Companies in the TPC sector face many challenges to remain competitive on the international stage. According to Kumar (2005), the main challenges of this market are the regulatory changes of health agencies, the safety of products in relation to health, issues about the environment, the use of natural ingredients and animal testing. In addition, companies are strongly impacted by the economic scenario and the effects of globalization that increase competitiveness amongst companies in this sector.

In this way, companies must strengthen their position in the market using new forms of information technology, especially with regards to marketing and sales over the internet, new sectors of therapeutic and ageing products, and the customization for different genders and ethnicities (Kumar, 2005).

Companies in the TPC sector tend to organize themselves into two main strategic groups. The first group operates in the personal care, cosmetics, pharmaceuticals, and food segments, in which companies take advantage of their competitive advantages, in terms of economies of scale and scope, such as Unilever, Procter & Gamble and Johnson & Johnson. The second group of companies tends to act more strategically in the perfumery and cosmetics sectors, focusing their efforts on more sophisticated and differentiated products, such as L'Oreal, Estee Lauder, Shiseido, Revlon, Coty e Avon (UNICAMP-IE-NEIT, 2002, DPP, 2008 as quoted in Vilha, 2009).

According to their 2019 yearbook L'Oreal (2019), the biggest companies in global sales are L'Oreal US$31,8 billion, followed by Unilever US$22,4 billion, Estée Lauder US$14,2 billion, Procter & Gamble US$13,2 billion, Shiseido com US$9,7 billion e Coty US$9,1 billion.

3.2 Brazilian scenario

The TPC industry is characterized by being a sector of high heterogeneity amongst companies, in addition to being highly dynamic due to the changes that occur along its path. This sector includes not only transnational companies, but also small and medium sized companies, looking for space in a highly competitive market. Innovation is the key to success for most companies, as the development of new products serves a wide range of consumers of different genders, ages and ethnicities. (Kumar, 2005, Kumar, Massie & Dumonceaux, 2006, Fritz & Souza, 2006, Banco Nacional de Desenvolvimento Econômico e Social [BNDES], 2007, Cruz & França, 2008, Vilha, 2009, Gallas, Vargas, & Lenzi, 2015).

We can classify the products of the TPC industry in three main segments as follows: 1. Personal Hygiene: made up of soaps, oral hygiene products, deodorants, sanitary pads, shaving products, disposable nappies, talcum powders, hair hygiene products etc.; 2. Cosmetics: hair colouring and treatment products, hair fixers and stylers, make up, sunscreen, cream and skin lotions, hair removers etc.; and 3. Perfumery: perfumes and extracts, eau de cologne, after shave products etc. (Banco Nacional de Desenvolvimento Econômico e Social [BNDES], 2007, p. 135).

In Brazil, there is a strong presence of large multinational companies that have factories here such as Unilever, Procter & Gamble and Colgate-Palmolive, Johnson & Johnson, L'Oreal, Shiseido, Mary Kay, Estee Lauder, Revlon, Coty, Avon and Nu Skin. Amongst the large national companies two stand out, Natura e o Boticário (Villa, 2009). Large companies are supplied by major global suppliers of formula ingredients known as "Fragrance Houses", such as Firmenich, Givaudan and IFF and by product components such as Wheaton (glass packages), and use local markets to transform these components into final products (Kumar, 2005).

However, due to the characteristics of some products that require low operational technology in their production, there are a large number of small and medium sized companies that specialize in specific market niches that are not explored by large corporations. Amongst them are companies such as Leite de Rosas, Água de Cheiro and Contém 1g (Agência Brasileira de Desenvolvimento Industrial [ABDI], 2008, Vilha, 2009).

According to the Brazilian Association of TPC Industry (ABHIPEC, 2019), the TPC sector is undergoing significant changes in current market trends. Product personalization and experience, social issues such as gender, the relevance of *micro–influencers*, the search for natural ingredients so as to minimize the impact on the environment and the longevity of the population, are the new strategic market drivers.

According to Kumar, Massie & Dumonceaux (2006, p. 292), "innovation is the key to success for the cosmetics industry". This is because it is characteristic of the sector to offer consumers more and more innovative products and solutions, using technology as a fundamental factor to obtain competitive advantages. As a result, the useful life of products tends to be shorter, reaching a maximum of 3 months, which challenges the industry in managing its production chain. It is a reality of the sector to practice subcontracting agreements for activities in the production process in companies specialized in the manufacture of the product (Banco Nacional de Desenvolvimento Econômico e Social [BNDES], 2007). A well-known example in the market is the position of the German company Weckerle which provides high technology for various products in the cosmetics category, such as the production of lipsticks and compacts with more than one colour (Artikel, 2020).

Given the high level of integration and exchange of knowledge regarding innovative practices, the TPC sector seeks to be in direct contact with its consumers and establish partnerships with its main suppliers. The constant search for innovation makes companies more open, interacting with the social environment in which they participate whilst using technological platforms to their benefit. In this way, the ability to absorb this knowledge has been interpreted as a learning process for companies to better understand organizational competitiveness (Celadon & Sbragia, 2015).

4 Methodology

In order to understand the innovative dynamics of companies based on learning processes, this article aims to identify and analyze evidence of the learning processes as a source of innovation in companies, through a qualitative study with an exploratory approach in a large company of the TPC sector in Brazil.

As we saw in section 1.4, the choice of this sector is due to its representativeness in the Brazilian and world economy. According to AHIPEC (2020), the TPC sector in Brazil is quite representative in the world, ranking 4th in the world market in 2019, with the presence of the main multinational companies, such as, Unilever, Procter & Gamble, L´Oreal and Estee Lauder. There is also representation by the Brazilian companies such as, Natura e O Boticário.

The company chosen for this study is a large multinational in the TPC sector, with revenues higher than USD 1 billion in Brazil (based on 2019 figures). This company has factories in Brazil, employs over 5000 people and operates in the TPC sector, being a leader in some areas.

Exploratory research allows the researcher to approach the natural environment of his research subject to collect information, verify its feasibility and define methodological aspects. (Creswell, 2021)

According to Gil (2008, p. 27), "the main purpose of exploratory research is to develop, clarify and modify concepts and ideas, with a view to formulating more precise problems or researchable hypotheses for further studies". As the suggested subject matter is little explored in Brazil, the exploratory research proposed in this article has exactly this role, that is, to formulate more precise problems and allow the elaboration of hypotheses for future research.

With this, the research, of a qualitative nature, has as main characteristics: it is being carried out in a natural environment in which the participants experience their daily lives, that is, in their own workplace; having the researcher as a data collection instrument, being able to use protocols to acquire information through documents, observations or interviews with the participants; perform inductive data analysis with the elaboration of data analysis standards and categories; have an interpretive ethos as a form of investigation of the collected data. (Creswell, 2021).

The empirical data collection was carried out through 6 in depth interviews, individually, in an on-line, semi-structured format (interview script) in a large multinational in the TPC sector in Brazil. The interviews were conducted and recorded using the *Microsoft Teams* platform taking an average of 30 minutes each. After which the interviews were transcribed by the authors.

According to Creswell (2021, p. 212), "the idea behind qualitative research is the intentional selection of participants or locations (or documents or visual material) that will best help the researcher the research problem and question". In this way, an interview script composed of open questions was applied in order to obtain in-depth answers on the issues addressed by this article. The interviews were directed, for the sake of expediency, to professionals with managerial positions and who participate in decisions that involve the innovation process in the chose company.

According to Gil (2008, p. 94), "accessibility or convenience sampling is the least rigorous of all types of sampling. That is why it is devoid of any statistical rigor". It is up to the researcher to select the elements that he has access to and that can represent the universe to be researched. This method is applied to the type of sampling in exploratory or qualitative studies, where a high level of precision is not required. (Gil, 2008)

Therefore, as shown in the table below, a total of 6 in-depth interviews were carried out, highlighting the date of the interview, how long the interviewee has worked at the company, and their respective titles/positions for analysis in the next chapter about presentation and discussion of results.

Table 1

Identification of the interviewees

Present title	Date of interview	Years with the company	Nomenclature for analysis
Production Manager	30/oct/20	14 years	Engineer I
Packaging Coordinator	30/oct/20	10 years	Engineer II
R&D Manager	04/nov/20	5 years	R&D I
Marketing Manager	06/nov/20	5 years	MKT I
Formula Manager	18/nov/20	10 years	R&D II
Marketing Manager	23/nov/20	5 years	MKT II

Source: From authors' authority.

The data obtained was submitted to a content analysis, which went through the three phases suggested by Bardin (2016): pre-analysis, exploration of the material, and processing of the results, inference and interpretation. In the pre-analysis phase, the interview script was defined as 13 questions directed to the 6 representatives of the chosen company. In the processing of results phase, it was decided to establish 2 thematic categories – formal routines and informal routines – in order to group the concepts discussed in the theoretical framework. The first category of formal routines is characterized by institutionalized procedures and policies. The second category of informal routines occurs as an unintended by-product of the company's design, production and marketing activities that enhance learning through practice, use and interaction. (Lundvall, Jensen, Johnson, & Lorenz, 2016).

5 Results

The presentation of the results is based on the analysis of data from the interviews carried out in the chosen company. Whenever possible, we will analyze these results by approaching the evidence found in the literature within this article.

5.1 The importance of innovation to the chosen company

The importance of innovation for the company's growth was evidenced by all interviewees in the selected company. The search for consumer loyalty, in the face of strong competition in the market, makes the company direct its actions to the promotion of innovations that allow it to remain competitive. As we have seen in the literature, the TPC industry is characterized by high heterogeneity amongst the companies, in addition to being highly dynamic due to the changes that occur along its path. According to Kumar, "innovation is the key to success for the cosmetics industry" (Kumar, Massie & Dumonceaux, 2006, p. 292, our translation), and this can be seen by interviewee MKT II, shown below, who points out that the generation of innovations as a fundamental factor for the company to remain competitive in the market: "We see this [innovation] as fundamental for the company's growth and as in the make-up market companies innovate a lot, if you don't have something so representative you end up being left behind" (MKT II).

According to the same interviewee, being ahead of new trends and providing new innovative solutions to the business demonstrate to the consumer that the company is active in its segment and such perception, in turn, provides greater results. "I think that one way for you to stay active in the market is to show the consumer that you are always ahead of trends, bringing new technologies and new benefits" (MKT II).

Innovation is also a need of the market for the selected company. It is a consumer demand and to remain competitive, the selected company prepares itself to generate more and more innovations.

> It is fundamental because we see our consumers, who are actually retailers and end users, asking for more and more innovations. We see a lot of pressure from our consumers to innovate with new products, new technologies and not to lag behind our competitors and, in order not to lose market share, not to lose our competitiveness, we have to innovate more and more in our products as well. So, I think it ends up being a competitive advantage that we have a very high innovation bias. (R&D I).

Innovation in the production process is as important as innovation in the final product. Production must keep up with the speed of product launches and generate more and more efficiency in order to have a positive impact on the company. "Purely technological innovation has as its main objective the reduction of losses in a production process, optimize processes, restructure and realign the organizational structures. Allow us to work in a matrix way in the coming years" (Engineer I).

In this way, innovation impacts the company's need to invest in new projects. According to the interviewee: "It is also important to know where to direct your investments. It is really

through innovation that the company will understand where it needs to invest more and where it wants to grow" (Engineer II).

5.2 Evidence of learning as a source of innovation

In the table below, we present the results in which we highlight, with an "x", the routine occurred associated with the learning identified by our interpretation of the data collected through the interviews. Blank fields indicate that no significant evidence was found which could be highlighted.

Table 2

Occurrence of learning as a source of innovation

Type of Learning	Thematic Categories	Primary Source					
		Engineer I	Engineer II	R&D I	R&D II	MKT I	MKT II
Doing	Formal Routines	X			X		
	Informal Routines	X	X	X	X	X	X
Using	Formal Routines				X	X	X
	Informal Routines	X	X	X	X	X	X
Interaction	Formal Routines	X	X	X	X	X	X
	Informal Routines	X	X	X	X	X	X

Source: From authors' authority.

In general, we found that the category of informal routines is evidenced with the types of learning that we considered during this research. This result finds its explanation in the literature, since this category of informal routines is acquired largely during the workday, as employees are faced with day-to-day problems and challenges, requiring them to seek new solutions to solve them. (Lundvall, Jensen, Johnson, & Lorenz, 2016).

5.3 Evidence of "learning by doing"

For the "learning by doing" method, in the selected company, informal routines were evidenced in all primary sources observed. However, as we can see in Table 2, it was highlighted in the Engineer I and R&D II interviews that there are also activities related to formal routines. This fact is upheld by the literature in which the type of learning "learning by

doing" is mainly characterized by the continuous productive activity through the contribution of cumulative learning in the growth of productivity and in the development of companies. (Malerba, 1992).

The "learning by doing" type of learning has as its objective the experience acquired from the production and commercialization activity of its products and services, from its organizational routines, which can be demonstrated through internal procedures or simply from experiences. Examples of formal routines are tests and prototypes, the product formulation process and the company's *post-mortem*[3] analyses. On the other hand, informal routines were quite evident in the occurrence of team meetings, *brainstorm*[4] sessions and cross-functional teams.

According to interviewee Engineer I, during production there is the procedure of carrying out tests and prototyping in order to help the operational team acquire accumulated learning for its execution on the production line. "It would be the running the tests, and prototyping the things that we will be able to improve and gain knowledge from. It all starts with theoretical development, but there is a practical test phase that will bring the necessary learning, which will bring the certainty of moving forward or not" (Engineer I).

It was evidenced by all the interviewees that the type of learning "learning by doing" is promoted by the informal routines that are demonstrated by the accumulated experience of the professionals who work in the company, standing out in activities such as team meetings, brainstorm sessions and transmission of knowledge between people.

> We have this issue of risks, a lot of the time. We don't have a place, a book, somewhere where all the related risks are written, and this is really done from the experience of each one over the years…I know that in the not-too-distant past we had a brainstorm session with the R&D and Innovation team to launch new products. (Engineer II).

These daily activities are important for the company to acquire, through the transmission of knowledge between people, a unique type of knowledge that offers greater conditions to improve the company's products and processes. In this sense, the generation of innovation based on "learning by doing" is more related to improving existing products and processes (incremental innovation), that is, there is a concern to improve that which already exists in the market.

Thus, "learning by doing" encompasses mostly informal activities in which people do not have procedures, processes or internal policies that are typical of routines for formal

[3] *Postmortem* analysis has the objective of comparing the result obtained by the innovation after its launch, in relation to what had been planned previously. With this, the company obtains information regarding the performance of the innovation and tries to adapt itself with the new results obtained.
[4] Brainstorm sessions are individual or team activities with the objective of exploring new ideas and solutions to a proposed theme.

activities, which allow them to measure these initiatives with the objective of generating innovations.

It is possible that pioneering innovations in this type of "learning by doing" may occur, but it is evident that there is a greater predominance in the generation of incremental innovations in the company's products and processes, in order to increasingly improve what has already been developed and launched in the market. As we have seen in the literature, "incremental innovations" occur continuously in companies, depending on the type of industry, country, technology, and socio-cultural factors. They are usually the results of daily improvements and modifications by the R&D department, but also from innovations and improvements suggested by engineers in the production process or even suggested by customers (Freeman, 1988).

5.4 Evidence of "learning by doing"

For the "learning by use" type, in the selected company, informal routines were evidenced in all primary sources. However, as we can see in Table 2, it was highlighted by R&D II, MKT I e MKT II in their interviews, that there are also activities related to formal routines.

The "learn by using" type has in its scope, activities related to the experience of consumers or customers (users of products and/or services offered by the company), which can be demonstrated through feedback on the use or consumption of its products and/or services. Examples of formal routines are the area of Customer Service, systematic monitoring of social networks carried out by the digital communications department, advertising agency and formal consumer research. On the other hand, informal routines were quite evident in the informal use of social networks carried out mainly by the marketing area, with the objective of knowing and updating the main subject matters and informal conversations with the resellers of the company's products and also with bloggers and *influencers*[5].

Evidence indicates that the activities of capturing and receiving information that take place within the structure of the Customer Service and the information generated by social networks, on the internet, are the main source of information for this learning. There is also the hiring of an advertising agency and the use of formal surveys with consumers to better understand their consumption behaviour. According to R&D II, the type of learning in "learning by using" is caught through the Customer Service. "It ["learning by using"] takes place in the company through the complaints or suggestions received by CS." (R&D II).

[5] *Influencers*: are people whose job is to create content for the internet (videos and texts) with the sole objective of influencing their followers.

CS is considered is considered a typically formal routine for the company, as it has an established internal policy, with explicit processes and a set of activities and tasks systematically defined for the people who work in this department. In this way, the company's CS is used as one of the main sources of information to obtain feedback on consumer satisfaction and, currently, the internet is also an important vehicle widely used to understand consumer behaviour. It is possible to verify in the literature that the solution of problems in the learning process requires interaction and feedback throughout the productive process at the company level. (Malerba & Pisano, 2019, Lundvall, Jensen, Johnson, & Lorenz, 2016).

The above example has support in the literature in which the codification of experience, requires a stock of past knowledge to capture new ideas in the production process. In addition, this process helps the company to disseminate existing knowledge throughout the organization, thus generating organizational knowledge. (Arndt, Fourne & MacInerney-May, 2018).

However, in the case of social networks on the internet, we identified with the interviewee's activities of formal and informal routines in the relationship with the consumer. According to interviewee MKT I (2020), social networks are used to gain greater knowledge of the consumer and encourage the use of new products with the participation of bloggers. "Of course, we always keep an eye on social media with the company's own Instagram account to see what consumers are thinking of our products. Many bloggers do YouTube reviews and Instagram videos to say what's cool and what's not" (MKT I).

Although the selected company has a formal routine for monitoring social networks carried out by the digital communications department, there is also an informal activity carried out mainly by the Marketing department. According to MKT I: "In a very informal way, we keep an eye on Instagram and other social networks. Of course, the digital communications team has a greater formality in this analysis" (MKT I)

The evidence is supported by the literature, since informal routines also generate knowledge in order to help the company respond to the demands of product users. (Lundvall, Jensen, Johnson, & Lorenz, 2016).

5.5 Evidence of "learning by interaction"

In the interviews carried out in the selected company, highlighted in Table 2, there is a robust use of the type of learning known as "learning by interacting", to generate innovations in the company. This is because we identified strong evidence in all respondents that there is a consolidated process with suppliers and business partners, that feed formal and informal

routines to generate innovation. This fact is supported by the literature that indicates that it becomes increasingly important for companies to combine a complex knowledge base and highly developed expertise with suppliers and business partners in a rapidly changing environment. (Lundvall, Jensen, Johnson, & Lorenz, 2016). According to Demircioglu, Audretsch, and Slaper (2019), empirical studies in differing industrial sectors in the United States show that clients, workers, and universities are the principal sources if innovation for companies.

The "learning by interacting" type is related to both the interaction with sources of knowledge that suppliers have and the cooperation with other companies in the same sector or with other organizations (such as research universities). Examples of formal routines include the annual meeting with suppliers and the cooperation with start-ups, universities, and specialized research institutes. Informal routines were quite evident in activities related to non-regular meetings, meetings and conferences with suppliers and business partners.

Studies also show that there is a positive correlation between cooperation and innovation. The absorption of new knowledge from business partners, the sharing of costs, risks, and the optimization of time for innovation are highlighted in a positive way for the establishment of cooperation for innovation initiatives. (Tessarin, Suzigan, & Guilhoto, 2020, Bastos & Brito, 2017, Zucoloto & Cassiolato, 2012). "Companies that cooperate to innovate have a greater capacity to innovate and accumulate knowledge and are able to make better use of the knowledge available outside the firm" (Tessarin, Suzigan, & Guilhoto, 2020, p. 675).

Formal routines are evidenced in the holding of regular programs and formal working meetings together with suppliers and business partners. According to the interviewees, the company has cooperation from start-ups, universities, and specialized research institutes, that provide contracts for the development of new products and processes, in addition to holding an annual meeting with the company's main suppliers. Informal routines were highlighted in activities during non-regular meetings, normal meetings and conferences with its main suppliers and business partners. When combined, formal and informal routines aim to promote pioneering innovations for the business. This is due to the fact that the company very often uses the external environment to promote the launch of new products or significantly improve current products. According to R&D I (2020), these formal and informal routines of "learning by interacting" allow the company to think "outside the box", that is, to think of innovative solutions for the business.

> I think it is fundamental in this case, because, generally suppliers, universities, and research organizations are able to create products and packages that are even more "outside of the box". Those who work internally in the company are usually not focused on researching new materials and new applications for a particular product. This usually comes from vendors partnering with universities and research centres. (R&D I).

It is clear from the examples above that "learning by interacting" has a strong correlation with the generation of pioneering innovations in the selected company, since it was structured internally to maximize the opportunities presented in its relationship network. "Innovation as an interactive process" establishes a co-evolution of internal and external sources, which present themselves to the company where both contribute to the innovative process and should be seen as a way to promote the innovative process (Lundvall, Jensen, Johnson, & Lorenz, 2016).

6 Conclusion

Our analysis regarding the chosen company from the TPC sector, in Brazil, indicates evidence of the existence of the learning process as a source of innovation. The indication is more evident for the type of learning known as "learning by interacting", but important contributions of other types of learning were also identified, such as "learning by doing" and "learning by using".

In this sense, we can recognize coexistence and synergy between the routines identified in the present study. Formal routines are exemplified in explicit and codified processes in the chosen company, in production tests and prototypes, in product formulation processes, in knowledge generating areas such as Customer Service and the digital communications department, in cooperation with start-ups, universities and research institutes. Informal routines are represented in team meeting activities, formation of cross functional teams, constant use of social networks, in conversations with retailer, blogger sand influencers, and in non-regular meetings, regular meetings and conferences with suppliers and business partners.

In view of this, it is important to note that the two categories which express the learning process as a source of innovation – formal and informal routines – create knowledge for the chosen company in generating innovations. Although present, in a greater or lesser degree, these routines contribute to the learning process in the continued creation of innovation within the company and is a competitive differentiation/advantage in the TPC sector in Brazil.

With this, we verified that the cumulative learning contributes to the generation of innovations within the company, through formal and informal routines regarding activities related to innovation. We noticed that the types of learning "learning by doing" and "learning

by using" were more related to informal activities in the company, contributing to the growth in tacit knowledge. "Learning by interacting" is related to both formal and informal activities, with a large input from the external environment in directing the main innovations created by the company.

The reports presented indicate that the company creates its own knowledge from different types of learning ("learning by doing", "learning by using" and "learning by interaction") throughout its historical path. This cumulative learning tends to generate tacit capabilities which are specific to the company itself leading it to be unique in the market in generating innovation.

However, we recommend a deeper study of the chosen company in order to expand the area of evidence, incorporating new areas and situations, that were not covered in this research, such as, for example, the inclusion of professionals from different departments, as well as other levels such as Directors. We also recommend further studies with other companies in the TPC sector in order to corroborate the evidence found in this study, and also point out new evidence of how the learning process contributes to the generation of innovations. Finally, we also recommend the need to carry out research with quantitative data in order to allow a replication of the research within other contexts and organizations, and, in this way, solidify the theories and relationships between the topics covered by this article. In view of this, we recommend the inclusion of questions related to the learning process in more comprehensive surveys such as PINTEC in Brazil, to analyze the indicators addressed in this research on a national scale and expand this to the whole of Brazil in different productive sectors.

Authors' contributions

Contribution	Garcia, M.	Pamplona, J. B.	Silveira, M. A. P.
Contextualization	X	X	X
Methodology	X	X	X
Software	X	----	----
Validation	X	X	----
Formal analysis	X	X	X
Investigation	X	----	----
Resources	X	----	----
Data curation	X	----	----
Original	X	X	X
Revision and editing	X	X	X
Viewing	X	X	----
Supervision	X	X	----
Project management	X	----	----
Obtaining funding	----	----	----

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