RN
Revista de Negócios
Studies on emerging countries

Programa de Pós-Graduação em Administração Brasil ISSN 1980-4431

FURB
UNIVERSIDADE DE BLUMENAU

Contents

Volume 26, Number 3, July 2021

Articles

PRESENTATION

Revista de Negócios is located in Blumenau, state of Santa Catarina, Brazil, in the campus of Universidade Regional de Blumenau—FURB, post-graduate programme in Business Administration. Revista de Negócios is published quarterly in January, April, July and October on the website furb.br/rn.

POSTMASTER: Universidade Regional de Blumenau-FURB, Rua Antônio da Veiga, 140 - Victor Konder, Blumenau - SC, 89012-900. Department: PPGAD/FURB - D102.

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An omni-channel transformation in a Brazilian Retailer: the role of Supply Chain

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KEYWORDS

Supply Chain, Retail, Omni-channel, Digital Transformation.

Received 17.12.2019
Reviewed 22.06.2020
Accepted 15.05.2021

ISSN 1980-4431
Double blind review

ABSTRACT

As a more comprehensive evolution of the concept of customer service channels, the omnichannel was driven by the new information and communication technologies that have the consumer to a new dynamic in the relationship with retailers. This new dynamic imposes on the retailer a series of changes in its supply chain management processes, as evidenced by the literature. The relevant authors report that new strategies of omnichannel are fundamental for retailers, making them more and more customized, either in online stores or physical stores. The aim of this article is to identify the impacts caused by the implementation of the omnichannel strategy in the planning and management processes of the supply chain of a Brazilian retail network. The research method covers a review of literature about omnichannel retail, supply chain management, and inventory management and also a case study of a Brazilian retailer that markets durable goods of several segments and adopted an omnichannel strategy. From the analysis carried out, it can be seen the positive impacts of the implementation of the omnichannel strategy: it worked as a leverage tool for the financial results improvements, and the organization was able to build a combination of its competitive advantages over other retailers compose by its network of physical stores with national coverage, its brands, and an omnichannel strategy.

PALAVRAS-CHAVE

Gestão da Cadeia de Suprimentos, Varejo, Multicanal, Transformação Digital.

RESUMO

Como uma evolução abrangente do conceito de canais de atendimento ao cliente, o multicanal foi impulsionado pelas novas tecnologias de informação e comunicação que levam o consumidor a uma nova dinâmica no relacionamento com o varejo. Essa nova dinâmica impõe ao varejista uma série de mudanças em seus processos de gestão da cadeia de suprimentos, conforme evidenciado pela literatura. Os autores relevantes relatam que novas estratégias de multicanal são fundamentais para o varejo, tornando-as cada vez mais customizadas, seja nas lojas virtuais ou físicas. O objetivo deste artigo é identificar os impactos causados pela implementação da estratégia multicanal nos processos de planejamento e gestão da cadeia de suprimentos de uma rede varejista brasileira. O método de pesquisa abrange uma revisão da literatura sobre varejo multicanal, gestão da cadeia de suprimentos e gestão de estoque e um estudo de caso de um varejista brasileiro que comercializa bens duráveis de diversos segmentos e adota uma estratégia multicanal. A partir da análise realizada, é possível perceber os impactos positivos da implantação da estratégia multicanal: funcionou como uma ferramenta de alavancagem para a melhoria dos resultados financeiros, e a organização conseguiu construir uma combinação de suas vantagens competitivas sobre os demais varejistas que compõem por sua rede de lojas físicas com abrangência nacional, suas marcas e uma estratégia multicanal.

1 Introduction

Brazilian retailers go through an economic period characterized by significant challenges, among which KPMG (2016) cites the emergence of a new consumer profile and the need to adapt to new technologies. EBIT (2017) notes the increased competition, including new entrants from other countries. In this scenario, it is fundamental to seek efficiency in management by analyzing the actions that retailers can implement in response to the challenging environment and its impacts on the supply chain to ensure an increasingly pleasurable shopping experience for the consumer.

Brynjolfsson, Hu & Rahman (2013) state that to remain competitive, the retailer started to invest in proximity to the consumer through strategies seeking a differentiated and customized buying experience by integrating the online sales channel known as e-commerce with its physical stores. This integration between sales channels is known as a multi-channel strategy. Another more comprehensive approach involves the sales channels and any point of contact between retailer and customer. An omni-channel strategy puts the customer at the center of the business by interacting with the retailer and the brand, supported by new technologies such as smartphones and Big Data & Analytics.

For Rigbi (2011), the omni-channel strategy is an evolution of digital retail, and it is characterized as a consumer-retailer relationship executed through numerous physical or virtual channels. This relationship is strongly supported by technology, and the channels can overlap when the consumer makes the purchase online and withdraws the product in the store. Can be identified a direct impact on this strategy on how physical stores are supplied either by the supplier or by a retailer's distribution center. Suppose the store used to receive the products in batches for sale. In that case, it now becomes necessary to also receive units for direct delivery to the customer, which forces the retailer to reorganize its internal procedures and the supplier procedures.

The crucial aspects to be studied in stock management are consumer's behavior towards the lack of products and the logistic processes that lead to this shortage. The imbalance between supply and demand is a widespread problem in any supply chain and retail, and the final link is no different. The solution to product availability is to improve inventory management in retail and throughout the supply chain. Solutions that involve increasing inventories to mitigate inefficiencies go far beyond the solution once they create another problem represented by the business's working capital. In this sense, a holistic approach is necessary to consider the whole supply chain, its processes, and its integration. With this approach, it will be possible to identify the root causes of poor management of items such as people, inventory, cash flow, business partners, and information systems.

Based on these considerations, this research aims to identify the impacts caused by the implementation of the omni-channel strategy in the planning and management processes of the supply chain of a Brazilian retail network.

This research covers a gap in studies on omnichannel in Brazilian retail, an important sector of the economy. Being aware of the impacts generated by the implementation of the omnichannel strategy, specifically in Brazilian companies, the retailer can prepare adequately, aiming at the success of the performance, today necessary for the growth or even subsistence of retail.

2 Theoretical Framework

2.1. The Omni-Channel Retail

The Omni-Channel concept, a strategy that seeks greater proximity to a segment of consumers increasingly connected to the virtual world, and significant growth strongly affect retail as the last link in the supply chain. Verhoef, Kannan & Inman (2015) highlight two essential characteristics of the omni-channel strategy, the synergistic relationship of the contact points and the need to offer the consumer the same experience independent of the point of contact.

The omni-channel is the result of a process of evolution of customer service channels. According to Zhang et al. (2010), this explosion of online retail was motivated by the fact that the internet made it easier for the retailer to expand the offer of products to the consumer in a much faster way.

Explore a multi-channel operation offers the opportunity to collect much more consumer information. Knowing consumers' consumption habits allows the retailer to develop more customized and profitable offers, either in online or physical stores.

The impact of the introduction of the omni-channel is not limited to deliveries but also occurs at the retailer's distribution center that adapts to the new separation, transportation, and delivery model.

According to Tetteh & Xu (2014), the retail-consumer relationship that was once limited to the world of physical stores today is fully integrated into the digital world as well. The great challenge is to make this relationship consistent throughout all client-retailer-supplier interactions, the omni-channel proposal. Gallinno & Moreno (2014) demonstrate, for example, the importance of integrating online and physical stores as an essential element in improving the consumer buying experience.

Bell, Gallino & Moreno (2013) point out that physical stores play a relevant role in the omni-channel environment since specific categories of consumers are more sensitive to the product experience. This experience has the power to reduce the possibility of returns by the consumer, thus reducing the cost of the logistics operation.

Emrich, Paul & Rudolph (2015) explore the effects of assortment allocation by online channels and physical stores on consumer behavior on their shopping journey. The retailer can offer a much wider range of consumer products, which benefits the consumer in various supply and convenience aspects. In the omni-channel concept, the retailer can choose to eliminate any barrier to accessing the entire assortment of products offered.

EY (2015) warns that the implementation of the omni-channel strategy is not an initiative that increases profit or retail contribution margins immediately. The increase in billing may occur, but initially, it may affect the profit margin impacted by the demands of implementing this strategy, such as channel integration. The study cites that the retail supply chain was developed to supply physical stores and needs to adapt to meet the online consumer.

2.2 Delivering Value to Consumer

Kotler & Keller (2012) argue that it is not enough to manufacture and sell the product or service in competitive markets. It is necessary to "deliver value" to the customer, and this delivery happens by executing a sequence of coordinated interdepartmental activities.

One of the main reasons for the loss of value is the unavailability or lack of product (rupture). One of the most efficient companies in making the product available to the customer is Walmart, the largest retail chain in the world. The availability is possible because Walmart has an extensive collaborative network of information sharing with its main suppliers. Thus, when a product leaves the store, its replacement process is started in the supplier itself (Kotler & Keller, 2012).

Parente & Barki (2014) affirm that the variety of products and low level of ruptures increase the perception of value for the consumer. The prompt delivery and availability of the product for experimentation are the significant differentials that a physical store presents concerning the online channel.

Kumar & Reinartz (2016) argue that organizations exist to generate value for customers. Then the client, realizing the value offered, generate value for the organization in the profit format. For the final customer to perceive value, the retailer must guarantee a buying journey permeated by uniform experiences at all the relationship points. And part of this action has to translate into the delivery of the product or service to the consumer.

The impact of omni-channel on delivering consumer value and returning to the retailer is demonstrated in Deloitte (2014). According to the survey, consumers are looking forward to a shopping journey through multiple sales/service channels. They are willing to reward retailers for either buying higher-value items or brand recognition and loyalty.

The omni-channel generates value for the consumer by providing flexibility in their shopping journey through various contact points (website, mobile device, physical store). On the other hand, the consumer repays this value offer provided by the omni-channel retailer through a more significant purchase volume. The consumers would not purchase if there were no such flexibility.

Concerning the delivery of value to the consumer provided by the implementation of the omni-channel, it is also possible to add the role played by the sales team. Yurova et al. (2017) argue that the retailer should prepare the sales team to serve the omni-channel consumer. This consumer values the shopping experience, especially for hedonic products, such as high-tech electronics. Thus, a well-prepared sales team can add value to the consumer by providing relevant information about the product.

2.3 Supply Chain Management

Chopra and Meindl (2016) caution that the coordination of relationships in the supply chain only occurs if each chain link considers the impact of its actions on the previous and subsequent links. Although the relationship is simple to understand, there are difficulties in its implementation. Each element has its business objectives and goals. While there may be a common goal of serving the end customer, this is most perceived only in the last links in the chain.

In addition, organizational managers do not necessarily agree with each other, and coordination and collaboration between the chain links only exist through an intense exchange of information based on mutual trust.

Gibson, Defee & Ishfaq (2016) highlight the impacts of the growth of online retail and highlight the strategic priorities of the retail supply chain for the coming years and the individual actions that are being put into practice (Table 1).

Table 1-Priorities in retail supply chain management and respective strategies

Priority	Strategies
Increase the efficiency for the omni-channel consumer	Encourage the use of physical stores as a point of collection; Increase the use of "Big Data & Analytics" tools for trade-off decisions (price, delivery speed, etc.)
Use Supply Chain Competencies for Revenue Generation	Reduce lead time, increase availability, offer more convenient options, improve customer experience.
Stock Allocation	Reduce inventory area in stores with intensive use of IT tools to improve the replacement process.
Change Management	Recognition of the importance of human capital through investment in training and development, empowering teams to assist the new omni-channel consumer.

Source: Adapted from Gibson, Defee & Ishfaq (2016)

2.4 Inventory Management

Arnold (2008) cites that any company that wants to maximize its profits has to have a minimum inventory investment. This point is even more relevant in retail chains that do not usually control production despite having significant bargaining power and product positioning.

The availability of the product in the industry is related to the concept of service level provided to the retailer. After all, product availability in the industry influences the availability of products that the retailer will offer. Reinforcing the relevance of the issue, Parente and Barki (2014) argue that inventories absorb a large volume of financial resources and therefore deserve special management by the retailer.

The implementation of inventory management may require a broad transformation in the organization, demanding the elimination of departmental silos. Corrêa, Gianesi & Caon (2013) affirm that implementing robust management systems such as ERP (Enterprise Resources Management) aims to eliminate the lack of informational coordination between the areas, facilitating integration.

2.4.1 Inventory Management and the Omni-Channel

It is important to note that with the emergence of the omni-channel concept, the boundaries between the sales channels do not exist from the consumer's perspective.

The same reasoning is valid to inventories. Although they may be physically allocated in a sales channel (a physical store, for example), they will not necessarily be dedicated to exclusively serving this store's demand.

Gallino & Moreno (2014) point out that retailers that have a high degree of integration between online and offline channels (physical stores) can offer the consumer the possibility to make the purchase online and withdraw the product in the physical store, known as BOPS (Buy Online and Pickup at Store). This characteristic of the omni-channel concept creates a new challenge for the retailer and, consequently, the supply chain.

Under this concept, the stock becomes shared between the channels in a more dynamic way and from the consumer's perspective. Gallino & Moreno (2014) also warn of the impacts of channel integration and their inventories. This sharing increases the flow of consumers in physical stores, leading to increased sales and, consequently, the need to revise the criteria that define store inventories.

Gallino, Moreno & Stamatopoulos (2016) address the issue of dispersion of sales from the integration of sales channels and warn that this

characteristic of the omni-channel retailer needs to be considered in inventory management processes.

The phenomenon of channel integration can improve the consumer buying experience, making it more enjoyable as new service possibilities are introduced, eliminating points of friction in the consumer-retailer-brand relationship.

Guy (2015) and EY (2015) draw attention to the challenges that channel integration demands for inventory management in the omnichannel environment. The consumer wants to buy and receive products, regardless of the purchase channel used. This, from the retailer's perspective, is very complex because the history of demands supports his stock allocation. The new consumer does not see this way, demanding changes by the retailer to serve him.

Table 2-Inventory Utilization: Traditional Model and Omni-Channel Model

Physical Inventory Allocation	Traditional Model	Omni-Channel Model
Physical Store	The stock has to meet the store demand.	The stock has to meet the consumer's demand who purchased the product from the retailer, independent of the sales channel. He also has to meet the demand for replacement and sales in physical stores.
Distribution Center	The stock is destined to meet the demand for replacement and sale of the physical stores. It is also used to meet the demand of the online store.	
Supplier	The stock is intended to meet the retailer's demand, and it is delivered to the Retailer's Distribution Center or a physical store.	

Source: Author based on Gallino & Moreno (2014); EY (2015); Gallino, Moreno & Stamatopoulos (2016)

When considering the omni-channel model in the allocation and use of inventories, the retailer seeks to provide the customer with a better level of service (reduced lead time, increased availability). According to Verhoef, Kannan & Inman (2015), the retailer must analyze the variables involved and make the best decision about the product's origin and the delivered form to the consumer.

The consumer will benefit because it can receive the product faster, regardless of location, mainly in an online store. From the point of view of the retailer, the benefits will also exist. Freight and handling costs are also likely to be reduced. Ishfaq & Raja (2017) cite that moving stock in a physical store would be better used, serving consumers of the online channel and reducing operating expenses. In this scenario, EY (2015) alerts to the increasing complexity of supply chain management and, consequently, inventory management.

2.4.2 Inventory Management and Sales Forecast

Another element that adds complexity to inventory management in industry and retail is the sales forecast. Khun and Sternbeck (2012) report that the more accurate the sales forecast, the lower the need to maintain security stocks along with a retail distribution network (Distribution Centers, Physical Stores). Parente & Barki (2014) argue that retail sales forecasts are vital in the definition of volumes purchased from suppliers and resold to consumers.

Maab, Spruit & Wall (2014) conclude that statistical methods combined with analysis based on the experience of professionals involved in the demand management process can generate significant improvements in sales forecasting accuracy. This accuracy will provide substantial gains in the definition of adequate inventory levels and maintenance of the level of customer service since the quantity in stock is influenced by the level of demand accuracy (ARNOLD, 2008).

2.4.3 Inventory Management and Stockout

Turk (2011) points out that retailers should work together with their suppliers to seek continuous improvement of their value chain processes as the breach or stockout jeopardizes customer loyalty to the store and the supplier and the costs inherent in the loss of the sale.

Stockout is a persistent problem for retailers. Even with the advancement of new technologies and the implementation of collaborative processes, the issue remains a point of attention for any retailer (EHRENTHAL & STOZLE, 2012). On the other hand, consumer reactions to the lack of the desired product are numerous but have in common the damage to all links in the chain. This situation reinforces the need for an integrated chain-wide approach, mainly manufacturer and retailer, to mitigate or reduce the effects of product shortages (TURK, 2011).

2.5 Omni-Channel: Impacts

Hübner, Wollenburg & Holzapfel (2016) address the operational impacts on the following processes in the value chain of a retail company operating under a multi-channel approach to adopt the omni-channel strategy: Inventory Management; Handling of Products on the DC (Picking); Assortment Management; Delivery Management to the Consumer (Delivery Time and Model); Reverse Logistics (Returns); Management of the Organizational Structure (Organization Chart) and Management of Information Systems.

Regarding the unification of inventories, the authors acknowledge that, although the complexity of the operation, especially in the distribution centers, increases, the gains in terms of agility in meeting consumer orders overlap. Inventory integration, also supported by integrated information systems, is considered a prerequisite for implementing the omni-channel strategy. The authors emphasize that this inventory integration provides a synergistic integration of the channels regardless of channels or location.

It is worth emphasizing that the impacts of implementation can spread through other areas. Carvalho & Campomar (2014) note that the processes of consumer relationship management, usually associated with Marketing, need to be adapted to the new approach. It is up to Marketing to deepen their understanding of consumer buying behavior to create, for example, more individualized and customized experiences that can bring more results to the business.

Another area cited by Carvalho & Campomar (2014) is Human Resources Management. During the shopping journey, the consumer also interacts with employees, and they need to be prepared to deal with the omni-channel consumer. Not only the salespersons at the stores but the whole organization.

Kraemer (2015) lists actions to implement the omni-channel:

• Obtain integrated visibility of all inventories, i.e., Warehouses / DCs, Physical Stores, transit, and supplier;

• Develop a flexible distribution network with the logistics partners (suppliers, transporters, logistics operators) in line with omni-channel demand dynamics (allocation of spaces and services in a flexible way to meet the demand for shipments to stores and consumers);

• Consider innovative models for consumer delivery (Last Mile). Consider that the experience and the purchase journey also comprise the delivery stage.

• Maintain attention to the need to integrate the new Information and Communication Technology tools with legacy systems. There is a risk that they will become blockers to the omni-channel implementation since they have been developed from the perspective of a traditional retail supply chain.

To measure the performance of a hybrid supply chain, a chain that integrates the operations of online stores and physical stores, Kumar, Tiffany & Vaidya (2016) suggest adopting the set of defined SCOR (Supply Chain Operations Reference) performance indicators model.

From this survey, the authors sought to relate the initiatives that characterize the implementation of the omni-channel environment and the respective impacts in the operation and related areas. They have focused on order fulfillment and product delivery to the final consumer to elaborate on this relationship.

From the theoretical framework, the impacts of implementing the omni-channel strategy involve operational characteristics such as increased complexity in inventory management and others, like cultural changes.

The need to implement new functionalities in legacy information systems or acquire new systems in the addiction of the increased complexity in the storage and distribution processes due to greater fractionation of loads also impacts the omni-channel implementation.

An omni-channel organization demands more integration and collaboration between areas that previously acted in a segregated way by sales channel.

In terms of collaboration, it is vital to

Table 3 – Omni-Channel initiatives and impacts

OMNI-CHANNEL INITIATIVE	WHAT IS?	IMPACTS
Same price for all sales channels	Adopt the same or similar prices in physical stores and online store.	Need to implement systems that consider all business variables (taxes, competitors, margins) to determine the correct price; Review processes and organization for definition of price policy independent of the sales channel
CC: Click & Collect /BOPS	The consumer buy online and pickup at the store.	Increase in the uncertainty of the demand in the store and consequent difficulty in determining the store's ideal stock / ideal assortment; Increase of the picking operation in the Distribution Center (DC); Adequacy of the physical and organizational structure of the physical store; Reduction of Delivery Freight Cost; Increased customer flow in the store and possible conversion increase; Best consumer buying journey due to lead time reduction.
CR: Click & Reserve online/pickup at the store	Consumer has access to the stock available in the Physical Store or even in the distribution center and can make a reservation of the product for later billing and withdrawal in the physical store.	The need to implement procedures and systems that make it possible to make visibility of stocks of physical stores and DCs through the website; Increases the complexity of inventory management available in the physical store and on the DC; Reduction of Delivery Freight Cost; Increased customer flow in the store and possible conversion increase; Best consumer buying journey due to lead time reduction.
Physical Store acting as a small Distribution Center	Physical store billing and shipping to the consumer independent of the sales channel used to purchase the product. In addition, the physical store also operates supplying other stores, replacing the Distribution Center.	Increase in the uncertainty of the demand in the store and consequent difficulty in determining the store's ideal stock / ideal assortment; Adequacy of the physical and organizational structure of the physical store; Streamlines and optimizes inventory turnover through transfers to other stores and / or consumer sales Possible reduction of Delivery Freight cost due to the proximity of the stock of demand points (delivery place); Increased transport and inventory management complexity due to increased inventory dispersion.
Logistics operations integration at the DC (mainly stock)	The Distribution Center ceases to be segregated by sales channel and starts to serve all operations independent of the sales channel	Increase in the complexity of the operation that starts to meet shipments of different characteristics: fractional load (Orders of Online Shop) and Consolidated (Orders to Supply the Physical Store). Optimization of inventories that are no longer segregated by sales channel and begin to meet the consolidated demand (Physical Store and Online Store); Stockout reduction due to inventories optimization.
Provide Innovative Delivery Options for the Consumer (last mile)	Provide the consumer with options other than the usual delivery, such as: lockers, points of flow of people such as post offices, gas stations and shopping centers.	Requires the need to hire a specialized third party service as lockers suppliers and establish partnerships with companies (gas stations, post offices, malls); Institutional gains (the retailer's image and the customer's best shopping journey through convenience.

To be continued

Table 3 – Omni-Channel initiatives and impacts (continued)

OMNI-CHANNEL INITIATIVE	WHAT IS?	IMPACTS
Returns and changes in Physical Stores (reverse logistics)	Allow the consumer to use the structure of physical stores to make an exchange or return of the product purchased independent of the sales channel used	Adequacy of the physical and organizational structure of the physical store to receive consumer products; Speed inventory replenishment if returned product can be resold; Best consumer shopping journey due to the convenience offered.
Implement Full Inventory Visibility to Customer (Cross Channel Inventory Optimization)	Allow the sales team and also consumers to have full visibility of the inventories in the company (Stores, DCs and possibly suppliers)	Need to implement systems and management processes (Order Management System) in parallel to the maintenance of legacy systems; Need to implement technology and support processes to improve inventory controls in physical stores such as using radio frequency tags; Optimizes the use of inventory according to predefined business rules: better customer service and sustainable sales margins.
Implement the Omni-Channel organization	Delete organizational structures segregated by sales channel	Need to revise / adapt organizational structure. From: Organizational Structure by Channel, To: Consumer-Oriented Organizational Structure; Elimination of organizational silos through the implementation of a consumer-oriented structure, generating more communication and collaboration and also eliminating overlapping functions.
Withdrawal of the Product by the consumer in the DC (PickUp in DC)	Retailer offers the consumer the possibility of withdrawing the product in the Distribution Center speeding the delivery.	The need to review / adapt the organizational and physical structure of the DC to allow withdrawal of the product by the consumer; Best consumer buying journey due to reduced lead time and increased convenience.
Ship products directly to the consumer from the Supplier, without having to go through the retailer's installation (Ship Direct to Customer)	Implement shipments direct from supplier to consumer.	The need to implement partnerships and their organizational / operational structure to allow shipments from the supplier to the consumer; Necessary high degree of partnership with the supplier involving information of availability and visibility of the inventory; Reduction of storage and handling costs in the operation of the retailer; Best consumer buying journey due to lead time reduction.

Source: DHL (2015); Carvalho e Camponar (2014); Hubner, Wollenburg e Holzapfel (2016); Witcher et al. (2015); IBM (2016); EY (2015), Vogel e Paul (2015)

highlight the need to implement partnerships with other supply chain links as service providers such as haulers and even fuel stations to act as a pickup point to consumers. Positive impacts are also related, for example, from the financial point of view, the reduction of the freight cost of deliveries to the consumer, reduction of stockout rates due to inventory integration or optimization, and increase of the flow of consumers in physical stores.
Table 3 sumarizes the impacts of the implementation of the omni-channel strategy from the theoretical framework researched.

3 Methodology

The theoretical evidence of this research is based on information collected in periodical scientific publications, books, and theses published mainly from 2010 and searched in the databases Google Academic, Web of Sciences, and SciELO. The research also included reports regarding retail operations published by management consulting firms such as KPMG, EY, Deloitte and extensive logistics operators such as DHL.

The literature analysis on the subject sought to identify the impacts of the retail supply chain from implementing multi-channel strategies that improve the customer's buying experience. In addition, it highlights the actions of the retailers to maximize the effects of this strategy on consumer loyalty.

From the literature analysis, some theoretical propositions were validated by empirical evidence collected through interviews, documentary analysis (public documents), and observations of the researcher in the field (stores, distribution center). The strategy of validating theoretical propositions is Yin's (2015) suggestion for a case study. Richardson et al. (2008) corroborate this strategy by stating that the data collection stage of the case study seeks to reinforce or even question the explored theory.

The case study carried out in a national retail chain aimed to analyze the actions taken in adapting its supply chain to integrating the logistics operations required by the omni-channel strategy.

Eisenhardt (1989) emphasizes that the case study seeks to understand the dynamics of a specific environment. The exploratory nature of the research considers that the omni-channel theme is relatively recent, mainly in Brazil. Still, it has been rapidly evolving due to the phenomenon of digital transformation that almost naturally reinforced the launch of new channels of relationship with the consumer.

The target company of the study, referred to as RETAILER, began its operation in 1950 and expanded nationally either through acquisitions of smaller retail chains or organically through the opening of new stores.

It is essential to affirm that RETAILER has added to its assets a set of brands (store flags) that can be considered a competitive advantage in this acquisition process. As a result of this expansion, an extensive logistics network was created, consisting of more than 1000 points, between stores and distribution centers. Its gross revenue is approximately R$ 30 Billion reais per year. In 2016 the company announced the decision to integrate its operations of physical stores and online stores and their inventories into a single company.

Among the expected synergies with integration, the company was worth highlighting: improving the consumer buying experience; search for competitive advantages in line with the new retail scenario; reduction of logistics costs; and using existing assets (physical stores) to leverage the operation of the online store.

The new strategies brought some impacts to commercial and logistics areas. To get evidence regarding these impacts, the researcher promoted semi-structured interviews with the heads of the areas, leading to the implementation of new strategies: Logistics and Infra-structure Director and Commercial Planning Director.

After the interviews, the two directors recommended visiting some physical stores and the main distribution center. In both cases, the researcher has been escorted by the Store Managers and Distribution Center Manager. Based on Yin (2010), the author sought to elaborate a script of questions associated with the research proposal to arise the impacts in planning and managing the retail supply chain. In this way, the questions draw attention to consequences, and possible solutions applied. After the interviews, the research executed the analysis and discussion of the theoretical and empirical evidence obtained, which were carried out considering each of the propositions established from the theoretical foundation.

4 Case Study

4.1 Data and Evidence Collected

The implementation of the omni-channel strategy has impacted the company's planning and management processes. To understand these impacts, the researchers get data from three evidence sources: interviews with the directors of the areas of Logistics and Commercial Planning and Pricing, document analysis, and observation.

The Logistics and Commercial Planning, and Pricing areas played a crucial role in the omni-channel implementation, so much important information was obtained. The two interviews were semi-structured and happened in person. It takes about two hours each. The questions were directed to strategics and operational impacts with omni-channel implementation.

In addition, the researchers consulted public documents on the financial and operational performance of RETAILER. As a publicly-held company, classified at a certain level of Corporate Governance at B³ (São Paulo Stock Exchange & BMF) under the supervision of CVM-Comissão de Valores Mobiliários, the organization provides operational and financial performance reports in a standard internationally accepted. The researchers also follow the teleconferences presented by the executive board for the investors. These are made after the interviews to validate the collected data in that stage.

Finally, the researchers made guided visits to the main Distribution Center and some stores. In this way, it was possible to obtain a perception of the impacts and respective actions taken to guarantee the success of the implementation. For collected this data, the researchers stayed at each place for three periods recording the activities and perception of the employees.

For the contents analysis, the researchers using the software Iramutec categorizes the texts' main issues.

The analysis of the collected evidence sought to validate the following propositions; these get by literature review:

1. Customers are pushing retailers to adopt the omni-channel strategy.

2. The adoption of the omni-channel strategy requires adaptations in the supply chain.

3. Advances in Information and Communication Technology (ICT) will work together to increase the supply chain's efficiency.

4. Omni-channel enhances retail competitiveness in an environment with more competition and changes in the consumer profile.

5. The omni-channel strategy requires integrated management of inventories and prices (online/offline).

4.2 Theoretical Propositions and Evidence

The analysis and discussion of the theoretical and empirical evidence obtained were carried out considering each one of the propositions established from the theoretical foundation:

4.2.1 P1: Clients are Pressuring Retailers to Adopt the Omni-Channel Strategy

Piotrowicz & Cuthbertson (2014) argue that the new generations demand technological resources that allow digital interaction with retailers. In this context, the proliferation of new technologies is cited as the driving force behind the omni-channel strategy. KPMG (2016) reinforces the role of "digital natives" or millennials by noting that retailers' investments in omni-channel platforms are among the primary initiatives to reach this segment of consumers. Cook (2014) points out that the buying experience of this consumer can be frustrating when on a shopping trip the same is faced with different prices for the same product in different sales channels. Piotrowicz & Cuthbertson (2014) still warn of generalizations about consumer behavior by pointing out that other criteria such as brand experience or product type (low-cost products, high-end products) are also associated with how consumers wish to interact with the retailer.

It was possible to observe that the area responsible for defining and executing the organization's pricing policy assumed a fundamental role. This area results from the unification of two areas that previously defined the prices of products for each channel independently. Called "Commercial Planning and Pricing," this area defined a pricing model to meet a pricing policy that provided the same or similar price situation for products independent of the channels. One factor that is taken into account is the price practiced only by strategic competitors. The price charged is not associated with the cost of operating the sales channel but rather with a view of the entire operation. There may be price differences between channels, but these are not significant to how they impact consumers' buying experience. In addition, it was possible to verify that the sales teams of physical stores, when confronted by a potential

price difference between online and physical stores, are ready to negotiate the lowest price to meet consumer expectations.

When browsing the channels (online and offline), the consumer is waiting for a unique experience. In the RETAILER company, the BOPS (buy online pickup at the store) indices showed constant growth throughout the year 2017, reaching 27% of all orders in Telephony, TV, Long Tail Technology, and Portable Long Tail from the online store. The analysis of the evolution of the withdrawal rate of the product in-store demonstrates that RETAILER responded to consumer demand. The number of products made available for this modality increased by 271% in 2017. And considering these products, the percentage that was withdrawn using store stock reached 57%. These advances represent advantages in terms of reducing the value of freight for both retailers and consumers. In addition, it means more convenience for the consumer because of the rapid availability of the product.

It can be said that this type of operation meets a consumer demand that does not see the channels as separate entities, even if the channels (online and offline) operate under the same brand. In this scenario, the Logistics area was responsible for sending products to the physical store destined for direct delivery to the online store's consumer.

In addition, it was possible to observe, through the follow-up of the conference calls for investors, the concern of the Executive Board with the service provided to the consumer. This statement is based on data about investments in information technology and logistics in the last quarter of 2017. The results were an excellent performance in the logistics area, which reflected more quality in the service provided to consumers, such as the speedup of deliveries and availability of products.

It was possible to conclude that actions implemented by the RETAILER meet the demands of the new consumer, which in turn demands a fluid, simple and uncomplicated experience during the buying journey

4.2.2 P2: The Adoption of the Omni-channel Strategy Requires Adaptations in the Supply Chain

Gibson, Defee & Ishfaq (2016) highlight actions for the supply chain to meet the demands of the omni-channel strategy. Among them, one can draw attention to inventory allocation that is no longer associated with the sales channel. In addition, with the increased consumer product delivery options that omni-channel provides, the supply chain needs to undergo a redesign. With the omni-channel, the consumer seeks convenience and wants to withdraw the product at physical stores or even receive the product at a pickup point such as a gas station. The supply chain can become a competitive edge by offering consumers convenience and a superior shopping experience.

Ishfaq & Raja (2017) warn of the necessary adaptations in the organization of physical stores when the retailer decides to use these stores as a point of withdrawal of products purchased in the online store (BOPS). Gibson, Defee & Ishfaq (2016) also cite the necessary adaptations to offer the consumer the possibility of using the sales/delivery channels as points of return for products. It requires an agile reverse logistics process to return the returned product for sale. Finally, retailers need to review their methods of forecasting sales and inventory allocation. After all, in an omni-channel environment are considered several options to meet the demand of integrated channels (online and offline).

In the company that was the object of the case study, an important organizational adaptation impacted the management of prices. The company had a differentiated price strategy for each channel, which, from a view of independent entities, considered that the sales generated in the physical store had to "pay" the store's costs as inventory maintenance costs, rent, sales staff, security, among others. This approach justified higher consumer prices than the online store that does not carry these costs. By unifying its operations online and offline, the pricing strategy became its strategy rather than the channel. In this sense, the area of Commercial Planning and Pricing was unified to serve the customer-focused business that does not differentiate service channels.

It is important to emphasize that the area of Commercial Planning and Pricing also needed to adapt to meet the demands of the Logistics area. Logistics leads the process of S & OP - Sales and Operations Planning responsible, among other things, for defining the allocation of stocks to maintain supply aligned with the commercial strategy. To meet this alignment, the Commercial Planning and Pricing area had to analyze the

commercial strategy of the channels considering that actions in the physical store impact consumer behavior in the online store and vice versa.

The Commercial Planning and Pricing area is also responsible for managing the relationship with suppliers of products for resale. This relationship did not undergo significant changes due to the omni-channel implementation. It is because purchases were already made on a consolidated basis. But both were defined separately. There was a need to purchase for the physical stores and another need purchase for the online store. Since the definition of volumes was separate, it was common for additional stock to be purchased. A possible excess inventory of a product in the physical stores was not considered in the definition of the volume of purchases for the online store. With the unification of inventories, purchases were optimized, and supplier relationship management processes became more robust, including maintaining the vendor's business strategies with RETAILER's business strategies. Previously this alignment was done separately for each sales channel regardless of the impact of the vendor's commercial actions that permeated the sales channels.

Finally, as a reflection of the omni-channel strategy, it is essential to mention the positioning of the Commercial Planning and Pricing area in the adoption of the e-marketplace concept. In this sense, there is no conflict when a business partner, known as a seller, offers a product on the online platform with a more advantageous price than the RETAILER. The benefit to the consumer prevails as a norm, and it is up to RETAILER to develop actions to compete with the business partner, not just the price factor.

For the Logistics area, responsible not only for the allocation and handling of inventories but mainly for the policies that govern the management of these inventories, the implementation of the omni-channel strategy brought the need for several adaptations. As responsible for the leadership of the S & OP process, logistics has the function of acting as an integrator of the several areas that contribute to the success of the process. Aspects such as leadership capacity and mobilization of the other areas for a common goal were determinants to reducing stockout rates.

It is essential to highlight the effort required to implement the BOPS modality. The withdrawal of the product using the stock of the store itself or using stock transferred from the Distribution Center (DC) requires an alignment of several processes with different areas. For example, the definition or revision of the product mix or portfolio offered by the physical store depends on the alignment of the areas of Logistics with the areas of Marketing and Commercial Planning and Pricing. The challenge also involves a significant shift towards the inter-unit transfer of products. In traditional logistics, the physical store was supplied with large volumes in consolidated packages. In the new model, the operation had to adapt to send products in unitary / fractionated packages to the consumer without going through unpacking in the physical store. The more consolidated cargo profile began to have a greater variety of products in different types of packages.

Another change in progress is implementing the project of turning a physical store into a mini distribution center. In this context, the number of nodes in the distribution network and the storage locations increases, increasing the complexity of inventory allocation management. In the view of the consumer, the advantages of this operation are evident. With the stocks closer to the demand points, the consumer gains agility in delivery and reduces freight cost.

It can be affirmed that the actions in progress or those already implemented by RETAILER agree with the proposition that the implementation of the omni-channel strategy requires that elements of the supply chain adapt to meet the demands of the omni-channel strategy. They review their processes, organization, and technological support to adjust the supply chain to the omni-channel model.

4.2.3 P3: Advances in Information and Communication Technology (ICT) Enhance Supply Chain Efficiency.

Bradlow et al. (2017) & Zhang et al. (2010) evaluate Information and Communication Technology (ICT) as an enabler of the multi-channel operations strategy and stress that this strategy allows the collection of more data regarding the consumer when there is interaction with the retailer. From the analysis of these data, it is possible to adopt specific actions to, for example, execute promotional actions aligned to the profile of the consumer purchase.

Witcher, Wider & Sheldon (2015) and Kraemer (2015) point out that order fulfillment methods in the omni-channel environment demand robust management systems (OMS-order management system) and storage management (WMS-warehouse management system). These information technology systems are considered as enabling an omni-channel operation because they provide, among other functionalities, integrated inventory visibility and control of the operations in the distribution center.

In the case study carried out and the OMS and WMS systems, the Commercial Planning and Pricing area invested in IT tools to meet the demand for a unified pricing strategy known as "Price Match." The company searched the market for specific software to manage the pricing strategy. This software had to comply with all business rules considering the numerous variables defined by RETAILER to guarantee a unified and profitable pricing strategy for the business.

Concerning the opportunities made possible by IT, it is also worth noting increased sales conversion in the physical store when using data collected from the consumer during their shopping journey in the online store. For example, we can mention the opportunities of cross-selling or up-selling generated from the analysis of the data collected during the purchase journey and historical data. In other words, a consumer who purchased a cell phone from the online store while taking the product from the physical store may be encouraged by the store's sales team to purchase, for example, theft insurance. This way, the retailer can get better contribution margins for the business from selling the two items, cell phone plus theft insurance.

In the case study, the Commercial Planning and Pricing area recognize that its performance in the execution of the processes is strongly based on the technology tools. They highlight the integration aspect of the databases of the consumer relationship systems (CRM-Customer Relationship Management) and business management (ERP-Enterprise Resource Management) through BI-Business Intelligence systems. By providing better inventory visibility across the Distribution Centers and Physical Stores network, information systems such as ERP enable store replenishment processes and inventory allocation to be much more assertive. Such move decisions combined with anticipated and managed demands in the S & OP-Sales and Operations planning process, under the leadership of the Logistics area, increase the efficiency of a high-value asset of RETAILER: the stock. From the Logistics point of view, this asset started to be a single inventory instead of the channel-separated inventory model. And this was reflected in systems, notably ERP. The S & OP process was automated with the acquisition of a specific tool since the RETAILER understood that the volume of data to be worked required a great effort of the logistics team. These actions have allowed the management of movements and inventory allocations along the logistics network to always be in line with expected demand, reducing the risk of shortages or excesses.

It is important to consider that a supply chain needs to be managed end-to-end. In the case study, it was also possible to highlight the effective use of technologies such as geolocation in the monitoring of product delivery routes, whether in the supply of a physical store or a delivery to the consumer.

4.2.4 P4: The Omni-Channel Strategy Enhances Retailer Competitiveness

Zhang et al. (2010) & Verhoef et al. (2015) state that the adoption of the omni-channel strategy meets the needs of the current consumer characterized by the desire to relate to the retailer uniquely independent of the sales channel. Piotrowicz and Cuthbertson (2014) cite that this ability to offer such a unique consumer experience is critical to the retailer's competitiveness.

Brynjolfsson, Hu, and Rahman (2013) argue that as barriers between the physical world and the virtual world are disappearing, retailers need to revise their strategies to stay competitive. The same authors say that strengthening partnerships between retailers and suppliers can create more competitive advantages for the retail supply chain. Finally, Albright & Nuce (2014) cite a retailer's ability to synergetically combine their physical store network with their online channel as a factor that creates a competitive advantage against retailers who do not use the omni-channel strategy.

In the study organization, the financial performance data released to the market in February / 2018 demonstrate the importance of adopting the omni-channel strategy. The company integrated its physical store operation with its online operating arm in the last quarter of 2016, and the fruits of this integration appear clearly in the

income statements of 2017. In presenting the results to the market, the management of RETAILER emphasized the achievements of the integration of channels highlighting improvement in the level of consumer service, more assertive pricing policy, and closer relationship with suppliers, among others.

According to FECOMÉRCIO-SP (2018), the retail segment took advantage of a resumption of consumption during 2017. In March 2018, FECOMERCIO-SP published a survey showing that the Household Consumption Intention Index increased by the 19th consecutive month. In this scenario, RETAILER was able to revert a loss of R $ 1 Billion, adjusted to meet accounting standards, the corporate reorganization, in 2016 to a net profit of R $ 195 Million in 2017. Other indicators such as EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) and net revenue presented the same positive performance. Net revenue increased by 11% and EBITDA margin increased by approximately 2.6 pp.

The sum of a good business environment, according to economic recovery statements published in the specialized press and by research institute like FECOMÉRCIO-SP, together with the implementation of actions aligned to an omni-channel strategy such as the integration of sales channels, generated very significant financial results

When observing the fundamentals of the theoretical proposition with omni-channel initiatives, such as integrating physical stores with the online store, implemented by RETAILER and its financial results, it can be affirmed that the proposition was corroborated.

4.2.5 P5: The Omni-Channel Strategy Calls for Integrated Inventory Management

Hübner, Wollenburg & Holzapfel (2016) show that integrated stock management is a key part of improving the consumer buying experience by providing faster and more efficient customer service than per-channel management. On the other hand, Ishfaq & Raja (2017) point out that the adoption of integrated inventories offers the consumer more possibilities of attending to their requests even though in this scenario, EY (2015) warns of the complexity of the supply chain management and consequently of the management of stocks.

Emrich, Paul & Rudolph (2015) point to the assortment of products offered in the online store and the physical store. The authors caution that the adoption of long-tail is not always reflected as an increase in consumer perceptions of convenience and variety.

The study's organization has implemented initiatives to improve the consumer buying journey and, consequently, in the experiences that this consumer experiences. This improvement is that the stockout rates in both the consolidated view and the per-channel view have been reduced. In physical stores, the stockout rate fell from 10% in 2016 to 5% in 2017. In the online store, the reduction was significant, from 55% in 2016 to 6.3% in 2017. In the consolidated view, the decline was 21% in 2016 to 5.3% in 2017. It appears that the consumer started to find the desired product more often. In addition, the delivery times of the product purchased by the consumer have been reduced. It occurs when the consumer buys a product from the online store and the stock using to deliver to him is in a physical store closer to home.

For these initiatives to take effect, it was necessary to unlink the inventory from the sales channel. The stock belongs to the company, not the sales channel, and its allocation is based on an omni-channel strategy.

It is important to highlight some actions that RETAILER has taken to implement integrated inventory management. Collaborative decision-making processes permeated the organization, and interviews confirmed this change in the organization's mindset, previously managed from the perspective of the sales channel and now in the omni-channel consumer view. One can mention the initiative of the Logistics area that created advanced teams of consultants who had as one of the attributes to spread knowledge of inventory management in an integrated way in stores, distribution centers, and other impacted areas such as Marketing. A consequence of this collaborative stance monitoring the assortment of stores that started to consider the demand for a product in the BOPS modality. In this scenario, a product that was not part of the assortment of the physical store may become part due to the demand of customers who wish to withdraw the product purchased in the online store. The benefit to the consumer is the

reduction in delivery time due to withdrawal at the store.

Therefore, it can be affirmed that proposition P5 is true because the implementation of the initiatives was only possible from the unification of the stocks and the adoption of integrated management.

4.3 Impacts caused by Omni-Channel strategy

Table 4 summarizes the impact of implementing the ommi-channel strategy based on the theoretical evidence (found in the bibliography consulted) and the empirical evidence (obtained through the case study).

It is possible to observe that there are impacts in both operational and organizational aspects. There is a clear need to reorganize various supply chain management processes, such as managing product deliveries in the physical store. These stores and the entire supply chain were prepared for supply operations, receiving consolidated products. They now had to prepare to receive fractionated products for delivery to consumers who bought them in the online store. Consequently, the store had to organize itself to meet a more significant influx of consumers that could eventually be taken to new purchases, this time in the physical store. Besides the operational aspect, it was necessary to prepare the store's sales team for the omni-channel concept and avoid a possible conflict of channels as the bibliographic researched alert. The human aspects can not be neglected in transformation processes, such as the implementation of this strategy. It is still important to highlight the internal reorganization that is necessary. Functional areas that operate segregated by channel need to adopt a new posture, more integrated and collaborative, as strategy demands. In this sense, processes that define and monitor inventories are essential. One can cite the S & OP process that originated in the industry and also applies to retail. This process is integrating all areas under a common goal that can be the improvement of the service provided to the consumer with the generation and maintenance of revenues in a sustainable way.

It is worth highlighting the actions that the company that is the subject of the case study has been taking to adapt to the new strategy. Reviewing business processes and implementing new systems to support these processes are part of fully integrating channels, a consumer demand. The role of technology can also be highlighted in the alignment of the sales price; a condition highlighted in the literature to ensure a buying journey permeated by satisfactory experiences for the consumer. The same happens in the management of product delivery processes to the consumer with technology support that monitors the entire delivery process. And the support of technology in planning support systems is hugely relevant.

Still worth mentioning organizational initiatives such as forming a dedicated team to act on inventory management processes, a prominent topic in reports from specialized consultancies and scientific research. The performance of this team is not limited to the area of logistics itself. Still, it goes further, interacting strongly with other areas such as Marketing and Sales in a collaborative way to maintain the balance between stock, demand and level of service provided to the consumer.

The impacts resulting from the initiative of transforming the physical store into a small center of distribution deserve attention since this project, although still in the pilot phase in the company, is very much in line with the omni-channel strategy and it is common to find research on the new role of the physical store in retail. While is possible observe challenges in the management of inventories there are also opportunities in terms of optimization of these stocks and a significant increase of convenience for the consumer.

Also on the aspect of consumer convenience, we can highlight the impacts under the reverse logistics process that allows the consumer to return the product purchased in the online store in physical stores. Reorganizing the internal processes to fit the physical store to handle these returns is something that has been occurring in the company and is in line with the expansion of the process of BOPS model, a model that has been widely accepted by the consumer.

Therefore, it is possible to notice impacts that require adjustments in the supply chain processes, but it should be noted that the initiatives demanded by omni-channel offer a counterpart in terms of consumer satisfaction and financial results.

OMNI-CHANNEL INITIATIVE	WHAT IS?	IMPACTS	CASE STUDY
Same price for all sales channels	Adopt the same or similar prices in physical stores and online store.	Need to implement systems that consider all business variables (taxes, competitors, margins) to determine the correct price; Review processes and organization for definition of price policy independent of the sales channel	YES. The company has acquired a tool that considers several variants to establish prices that guarantee adequate margins for the operation. YES. The company has unified its business planning areas.
CC: Click & Collect /BOPS	The consumer buy online and pickup at the store.	Increase in the uncertainty of the demand in the store and consequent difficulty in determining the store's ideal stock / ideal assortment; Increase of the picking operation in the Distribution Center (DC); Adequacy of the physical and organizational structure of the physical store; Reduction of Delivery Freight Cost; Increased customer flow in the store and possible conversion increase; Best consumer buying journey due to lead time reduction.	YES. To respond to this uncertainty, the company established a process of periodic review of the store's portfolio and implemented a process of S & OP - Sales and Operations Planning involving several areas including physical store managers. YES. The company reorganized the operation on the DC to meet this demand. YES. The company created an exclusive area in the physical store for handling and delivering consumer products which were bought at online store. YES. As the consumer himself has withdrawn the product in the store has reduced the freight delivery expense. IT WAS NOT POSSIBLE TO CONFIRM. YES. The acceptance of this modality of purchase by the consumer proves its effectiveness.
CR: Click & Reserve online/pickup at the store	Consumer has access to the stock available in the Physical Store or even in the distribution center and can make a reservation of the product for later billing and withdrawal in the physical store.	The need to implement procedures and systems that make it possible to make visibility of stocks of physical stores and DCs through the website; Increases the complexity of inventory management available in the physical store and on the DC; Reduction of Delivery Freight Cost; Increased customer flow in the store and possible conversion increase; Best consumer buying journey due to lead time reduction.	YES. To respond to this uncertainty, the company established a process of periodic review of the store's portfolio and implemented a process of S & OP - Sales and Operations Planning involving several areas including physical store managers. YES. The company reorganized the operation on the DC to meet this demand. YES. The company created an exclusive area in the physical store for handling and delivering consumer products which were bought at online store. YES. As the consumer himself has withdrawn the product in the store has reduced the freight delivery expense. IT WAS NOT POSSIBLE TO CONFIRM. YES. The acceptance of this modality of purchase by the consumer proves its effectiveness.
Physical Store acting as a small Distribution Center	Physical store billing and shipping to the consumer independent of the sales channel used to purchase the product. In addition, the physical store also operates supplying other stores, replacing the Distribution Center.	Increase in the uncertainty of the demand in the store and consequent difficulty in determining the store's ideal stock / ideal assortment; Adequacy of the physical and organizational structure of the physical store; Streamlines and optimizes inventory turnover through transfers to other stores and / or consumer sales Possible reduction of Delivery Freight cost due to the proximity of the stock of demand points (delivery place); Increased transport and inventory management complexity due to increased inventory dispersion.	The project of physical stores acting as mini-hub of distribution (mini-hub) is pilot phase with 5 stores. Adjustments are being made to expand the operation in the second half. The company also created a dedicated team of internal logistics consultants to monitor the implementation of the project in the physical stores.
Logistics operations integration at the DC (mainly stock)	The Distribution Center ceases to be segregated by sales channel and starts to serve all operations independent of the sales channel	Increase in the complexity of the operation that starts to meet shipments of different characteristics: fractional load (Orders of Online Shop) and Consolidated (Orders to Supply the Physical Store). Optimization of inventories that are no longer segregated by sales channel and begin to meet the consolidated demand (Physical Store and Online Store); Stockout reduction due to inventories optimization.	YES. Increase in the complexity of the operation that starts to meet shipments of different characteristics. Fractional (Online Shop Purchase) and Consolidated (Physical Store). At the end of 2017 the company made investments in equipment for the DC and in systems for transportation management. YES. Stock optimization by eliminating duplicity in the consolidated view compared to channel view. YES. The stockout indices showed a significant reduction in all dimensions analyzed: per channel and consolidated company.
Provide Innovative Delivery Options for the Consumer (last mile)	Provide the consumer with options other than the usual delivery, such as: lockers, points of flow of people such as post offices, gas stations and shopping centers.	Requires the need to hire a specialized third party service as lockers suppliers and establish partnerships with companies (gas stations, post offices, malls); Institutional gains (the retailer's image and the customer's best shopping journey through convenience.	YEA. The company has developed partnerships with specialized service providers for the use of lockers and a network of gas stations. Institutional gains (the retailer's image and the customer's best shopping journey through convenience).

To be continued

Table 4 – Omni-Channel initiatives and impacts based on case study

OMNI-CHANNEL INITIATIVE	WHAT IS?	IMPACTS	CASE STUDY
Returns and changes in Physical Stores (reverse logistics)	Allow the consumer to use the structure of physical stores to make an exchange or return of the product purchased independent of the sales channel used	Adequacy of the physical and organizational structure of the physical store to receive consumer products; Speed inventory replenishment if returned product can be resold; Best consumer shopping journey due to the convenience offered.	DO NOT. The return of products purchased through the online store can only be performed through collection service. Except products which were bought in the BOPS model.
Implement Full Inventory Visibility to Customer (Cross Channel Inventory Optimization)	Allow the sales team and also consumers to have full visibility of the inventories in the company (Stores, DCs and possibly suppliers)	Need to implement systems and management processes (Order Management System) in parallel to the maintenance of legacy systems; Need to implement technology and support processes to improve inventory controls in physical stores such as using radio frequency tags; Optimizes the use of inventory according to predefined business rules: better customer service and sustainable sales margins.	YES. The company has strengthened its systems and processes to ensure inventory accuracy both in stores and DCs with dedicated staff. YES. Partially. The definition of the best output location of the product is part of the scope of the small DC project that is in the pilot phase. Some rules have already been set for the system to decide to use product from the small DC (physical store) or to use the product from the nearest DC. YES. Partially. Punctual cases of consumer satisfaction were reported in interviews.
Implement the Omni-Channel organization	Delete organizational structures segregated by sales channel	Need to revise / adapt organizational structure. From: Organizational Structure by Channel, To: Consumer-Oriented Organizational Structure; Elimination of organizational silos through the implementation of a consumer-oriented structure, generating more communication and collaboration and also eliminating overlapping functions.	YES. Areas that operated separately, such as Commercial Planning & Pricing and Marketing, which focused on the channel were unified with a focus on serving the company, not the sales channel.
Withdrawal of the Product by the consumer in the DC (PickUp in DC)	Retailer offers the consumer the possibility of withdrawing the product in the Distribution Center speeding the delivery.	The need to review / adapt the organizational and physical structure of the DC to allow withdrawal of the product by the consumer; Best consumer buying journey due to reduced lead time and increased convenience.	Not Implemented
Ship products directly to the consumer from the Supplier, without having to go through the retailer's installation (Ship Direct to Customer)	Implement shipments direct from supplier to consumer.	The need to implement partnerships and their organizational / operational structure to allow shipments from the supplier to the consumer; Necessary high degree of partnership with the supplier involving information of availability and visibility of the inventory; Reduction of storage and handling costs in the operation of the retailer; Best consumer buying journey due to lead time reduction.	Not Implemented

Source: Author based on case study

5 Conclusion

The identification of the impacts resulting from the Omni-Channel implementation was accomplished by validating a group of theoretical propositions obtained from a literature review and the results of a case study in a retail company that operated in a multi-channel structure.

Regarding this integration, the RETAILER highlighted several synergies, such as the on-time impact of reducing the cost of inventories/working capital of R$ 325.000.000 due to the optimization of duplicate stocks. In addition to financial gains, initiatives aligned with the omni-channel strategy were highlighted, such as the acceleration of the BOPS modality, the reduction of stockout rates, and the benefits of multi-channel marketing. The same statement highlighted the efficiency of the transportation cost, the optimization of the purchasing process, and the sharing of distribution centers.

This integration movement occurred when retailers had a very challenging time at the end of 2015. In other words, in response to an adverse environment, the RETAILER reorganized itself by adopting a strategy that meets consumer demands and a year later presents significant results in both financial terms and the satisfaction of this consumer. It can be said that the case study was able to demonstrate that the adoption of the omni-channel strategy allied with the individual actions in the processes of planning and management of the supply chain contributed to the successful implementation of the strategy.

This study also concluded that there is an alignment between the bibliographic research and the researched environment. Among the solutions presented, it is worth mentioning the need for intensive use of technology tools. This technology is already available, and this is highlighted in all surveys and reports from consulting firms. However, it is essential to treat the omni-channel not as a technology project but as a business transformation project. In other words, in addition to technology, it is fundamental to address behavioral aspects. These initiatives will only be sustainable in the long run without the mentality of departmental silos that do not communicate or understand the business as channels when the consumer does not see these channels. One way to overcome these barriers is to implement integrative processes such as S & OP, where the most significant barrier is behavioral and not just technology or processes. For the success of these initiatives, it is also necessary to consider them as an action aligned with the company's strategy. It is still important to highlight the relevant results in the financial aspect since the bibliographic research also drew attention to investment and the return of the omni-channel implementation. Creating business differentials that generate sustainable results for the business is a basic premise in a very competitive environment. The initiative has to generate results, and for this, as some specialized consultancies call attention, transformations in the supply chain are fundamental.

6 Implications and Further Research

As a relevant contribution of the study, it is possible to cite the positive effect of implementing the omni-channel strategy. It worked as a leverage tool for the financial results improvements. Also, the organization was able to build a combination of its competitive advantages over other retailers compose of its network of physical stores with national coverage, its brands, and the omni-channel strategy. Only a few competitors would be able to achieve in this position in the short or medium term.

Regarding the limitations of the research, replicating the findings of the single case study could be done by conducting other studies involving other organizations (YIN, 2015). In this way, the conclusions could be considered more robust. The impacts can vary depending on maturity in terms of technology usage, process management, organizational culture, competitive environment, top management support, etc. Moreover is important to consider the speed of new technologies, like artificial intelligence, face recognition, autonomous vehicles in warehouses, 5G, etc. These tools will keep the retailers in constant change.

To minimize these limitations, the researcher sought other sources of information like following the conference calls to present results to the market (investors and stockholders) and reading and analyzing the relevant facts disclosed by RETAILER following the practices of corporate governance. Finally, on results declared to the capital market, it is important to mention that these are consolidated business data.

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RN Revista de Negócios
Studies on emerging countries

Analysis of the Relationship between Research Groups and Firms

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KEYWORDS

Research Groups, CNPq, Triple Helix, Firms Relationship, Innovation.

Received 31.07.2020
Reviewed 14.04.2021
Accepted 27.04.2021

ISSN 1980-4431
Double blind review

ABSTRACT

This research focuses on the interaction between universities and firms, considering a society based on the knowledge economy. The aim is to identify relationships between research groups and firms that most contribute to the innovative performance of Brazilian Public Educational Institutes (PEIs). The adopted database was the tabular plan of 2010, from the Research Groups Directory of CNPq. The method was based on statistical techniques, such as Spearman Correlation, Cluster Analysis, ANOVA and Discriminant Analysis. As a result, the most relevant relationships obtained were the transfer of technology developed by the group to the partner; non-routine engineering activity, including development/manufacturing of equipment for the group; and scientific research with considerations of immediate use, respectively. It is therefore emphasized that the encouragement of certain relationships can support an increase in the innovative potential of PEIs. As practical contributions, it is argued that these results help PEIs on determining innovative paths, which are based on development and transfer of technology, as well as the realization of practice-oriented research.

PALAVRAS-CHAVE

Grupos de pesquisa, CNPq, Tríplice hélice, Relacionamento com empresas, Inovação.

RESUMO

Este trabalho foca na interação entre universidades e empresas considerando a sociedade baseada na economia do conhecimento. Com o objetivo de identificar os relacionamentos entre grupos de pesquisa e empresas que mais contribuem para o desempenho inovador das Instituições Públicas de Ensino (IPEs) brasileiras, utilizou-se como base de dados o plano tabular do ano de 2010, do Diretório dos Grupos de Pesquisa do CNPq. A metodologia foi baseada em técnicas estatísticas, como Correlação de Spearman, Análise de Cluster, ANOVA e Análise Discriminante. Como resultado, obteve-se como como os relacionamentos mais importantes a transferência de tecnologia desenvolvida pelo grupo para o parceiro; desenvolvimento de software não-rotineiro para o grupo pelo parceiro; atividade de engenharia não-rotineira inclusive desenvolvimento/fabricação de equipamentos para o grupo; e pesquisa científica com considerações de uso imediato, respectivamente.Assim, enfatiza-se que o estímulo a determinados relacionamentos pode suportar um aumento do potencial inovador das IPES. Como contribuições práticas, argumenta-se que esses resultados auxiliam as IPES na determinação de caminhos inovadores, sendo estes baseados em desenvolvimento e transferência de tecnologia, assim como na realização de pesquisa orientadas para a prática.

1 Introduction

Globalized economic development has, over the time, reinforced the role of knowledge as a fundamental input of the innovative process, becoming, along with learning, the main sources of competitiveness. In this context the relevance of universities emerges as the main locus where knowledge and innovation are created (Rapini, Oliveira e Silva, 2016; Brekke, 2021). The national environment that seeks a better competitive positioning in global terms needs to develop its ability to create knowledge. Brazil fits this reality, even though still deficient regarding qualified labor, it has meaningful academic and scientific communities. In addition to this fact, the knowledge infrastructure is not well used by the private sector as it has the potential to be (Rapini & Righi, 2006; Souza, Zambalde, Mesquita, Souza, Silva, 2020). These considerations are brought to support the affirmation that the increase of university-firm interactions leads to innovative advances, directing the national context to the best posture in the face of global competitiveness (Rapini & Righi, 2007). The interaction between universities and firms (U-F) leads to a bilateral process of technology and knowledge transmission. (Meyer-Kramer & Schmoch, 1998), articulating scientific and technological infrastructure to institutionalism (Pavitt, 1998). This interaction brings up concepts like National Innovation System (NIS) and Triple Helix (3H). This work focuses on Triple Helix, since it exposes the importance of higher education to innovation, basing itself on the knowledge economy (Carayannis, Campbell & Rehman, 2016). Therefore, Triple Helix also enables the needed support to the findings of this study.

The concept of Triple Helix was stated by Henry Etzkovitz around 1990. In this model, the government-university-industry relationship is considered fundamental to the creation of a sustainable innovation system. This ends up stimulating the “emergence of incubator cores, innovation cores, technology transfer offices, new laws, funding mechanisms" (Valente, 2010, p. 6), technology parks, research institutes (Etzowitz, 2009) and research groups, this being the focus of this work.

The analysis of research groups is justified by considering them as basic units of the university. They promote and manage activities based on knowledge and innovation, as the engine of science and technology (Wang & Hicks, 2015; Qian, 2016; Aguiar-Díaz et al., 2016; Kyvik & Reymert, 2017). By using research groups as a base to operate the U-F interaction, previous studies that address the theme of relationship from different perspectives were followed. As examples, the studies of Rapini and Righi (2006), Rapini and Righi (2007), Rapini, Oliveira and Silva (2016), Souza, Antunes, Azevedo, Angélico and Zambalde (2019) and Garcia, Araújo, Mascarini, Santos and Costa (2019) are indicated.

The authors mentioned above highlight that there are demands for better understanding'' U-F relationships. These demands aim to support and foster strategic actions that can affect the potential benefits that expand beyond the related helices. Based on this gap, it is sought to answer the following problem: which relationships, between research groups and firms, contribute the most to the innovative performance of Brazilian Public Educational Institutes? Highlighting that, by understanding the universities' innovative performance, it could emphasize the impact of these institutes on the productive sector. Therefore, this article’s aim is to identify the relationships that contribute the most to the innovative performance of Brazilian Public Educational Institutes (PEIs). To this end, data from the Research Groups Directory of the National Council for Scientific and Technological Development (CNPq) was used.

Consequently, this work involves the available data from the Research Groups Directory of the CNPq from the 2010 Census, with focus on relationships between research groups and the productive sector. The collected data refer to 2010 (the last year of availability of the tabular plan).

The development of this study is justified and motivated by the following authors: Rapini and Righi (2006, 2007), Souza et al. (2019) and Brekke (2021). Accordingly, Rapini and Righi (2006) claim that current studies of U-F interaction are empirical and reveal little about Brazil's scenery. The study therefore uses a national database, which allows us to present the general context of innovation produced by universities in Brazilian territory. For Souza et al. (2019) the analysis of U-F relationships should not be based only on these relationships' quantitative aspects, but on the contributions that these interactions can generate and disseminate to innovation. In this aspect, the investigation has the potential to identify,

qualitatively, relationships that have the ability to manage and disseminate innovation. Lastly, Brekke (2021) highlights that, considering the role and process of authors, there is a need for studies that explore relationships as development engines. Therefore, this study's result has the ability to point to the role and process of university as a development promoter.

Finally, this article's results contribute theoretically to a detailed comprehension on operating two spheres of the Triple Helix. The results also support future analyses of this theory, providing data for more robust discussions about the universities' role and impact on society. In social terms, the results of U-F interactions have the potential to support the development of solutions for environmental and social issues. Moreover, in the practical scope, the findings provide guidelines to determine innovative and legal options. The rest of the study is divided in five sections: theoretical background, method, analysis of results and discussion, conclusion and implications and future research

2 Theoretical Background

2.1 The university-firm interaction by the triple helix perspective focusing on innovation

The interaction between firms and universities has an important role in the ability to combine and absorb knowledge (Rapini & Righi, 2007) and generate innovation. The combination of education and research in universities emerged in the early XIX century. Historically, the institution transitioned from a higher education institute to an institution with social purpose in education and research. Hence, universities became environments to integrate and differentiate the functions of knowledge base, in other words, they provide integration between academic education, theory and practice. (Etzkowitz & Leyersdorff, 1995, Souza et al., 2020).

The interaction between universities, the productive sector and government is particular to each country and exists in a competitive context where innovation is crucial. Thus, the creation of technology and knowledge transfer mechanisms add differentials in reaching and maintaining these institutions on the globalized system (Meyer-Kramer & Schmoch, 1998). In this context, the Triple Helix concept arises. According to Etzkowitz, Webster, Gebhardt and Terra (2000), the concept was suggested as a new institutional setting arisen from innovation systems that presents agents in network. The focus on the interaction between university, industry and government highlights the creation of hybrid arrangements where innovation is central and boosted by university, and, besides this, the government does not have the main role (Etzkowitz, Mello & Almeida, 2005).

The communication between the actors has a spiral pattern, where links emerge in various stages of the innovation process. The institutional and national boundaries go beyond, creating innovation environments as academic research groups, laboratories, incubators, among others (Etzkowitz & Leyersdorff, 1995, Brekke, 2021). These institutional boundaries, when exposed to dynamic relationship and interaction, bring a “first step to create the necessary and sufficient conditions to the sustainable innovation and development in a national or regional system” (Park & Leydesdorff, 2010, p. 641).

The participants of a Triple Helix have determinant features and roles. The universities act as the development engine based on knowledge of science and technology. The government is the keeper of interactions stability, supplier of incentive, benefits and research funding, legal activities. The firm, in contrast, represents the production of goods and services. It is also related to knowledge by encouraging and promoting it, both by training people and new ventures, guiding itself to research and market (Etzkowitz, 2009; Laguna, & Durán-Romero, 2017). Hence, the Triple Helix can be defined as a model in which its participants are related in a dynamic process of knowledge paths (Brekke, 2021). In this study, the interaction between firm, university and research institutions is focused through research groups. This interaction is then defined as a mechanism to fund the obtaining/supply of inputs to generate and develop innovation. The government, in this perspective, stands as the environment-influencing agent, where these interactions take place, as previously said.

2.2 Research groups: the university emphasis

In the current society, science is becoming the main development axis, here being represented by universities. These have a fundamental role on

scientific knowledge performing in different ways, as specialized people training (Rosemberg & Nelson, 1994), development of basic or applied scientific research (Nelson, 1990; Rosemberg, 1992), spin-offs (Etzkowitz & Leyersdorff, 2000), technology and academic entrepreneurship transfer (Haase, Araújo & Dias, 2005). Thus, university is the economical and innovation engine for progress (Aguiar-Díaz, Díaz-Díaz, Ballesteros-Rodríguez & Sáa-Pérez, 2016).

Research groups are placed in this context. Considered as basic units of university and seen as social entities, the research groups are composed by members with interdependent tasks based on complementary abilities (Guzzo & Dickson, 1996). They focus on the common goal to develop research, science and technology (Wang & Hicks, 2015; Qian, 2016) sharing material and financial resources (Aguiar-Díaz et al., 2016).

According to Kyvic and Reymert (2017), the adherence to research groups increases productivity and quality of publications. In this way, research groups are friendly environments to obtain and share intellectual abilities, as well as to obtain access to research funds. Research groups allow for the network expansion at national and international levels, acquiring knowledge on planning, development and research methods. The groups are shown as complementary sources of knowledge acquired in courses from the curriculum framework (Haan, Leeuw & Remery, 1994; Odelius, Abbad, Junior, Sena, Viana & Freitas, 2011; Kyvik & Reymert, 2017), helping the researcher development, in terms of methodological and intellectual expertise (Feldman, Divoll & Rogan-Klyve; 2013). Feldman et al. (2013) suggests that the participation in these groups promote relationships in which mentorship does not come just from the professor, whose participation and disposition is still fundamental. Thus, by working in a coordinated way based on cooperation, besides technical and theoretical abilities, the researcher acquires and/or develops social abilities (Odelius et al., 2011).

In Brazil, CNPq, through Research Groups Directory (RGD), categorizes and makes data available on research groups with the aim to promote the exchange of information. The RGD works as an instrument to plan and manage activities of science and technology, developing and preserving the memory of scientific-technological activity in the country. Studies such as that from Rapini e Righi (2006, 2007), which uses the RGD database, points out that research groups also contribute to the relationships with the firms. According to the results of the authors, in 2002 and 2004, 74% and 92%, respectively, of the amount of relationships originated from the group to the firm. Among the relationship types, in this period, the non-routine engineering activities, technical consulting, scientific research both with and without considerations of immediate use of the results and technology transfer were highlighted as the most performed between the agents. The authors emphasize that the "supremacy of the scientific research of immediate use and technology transfer is closer to the university, including the advance of the development of a common language" (Rapini & Righi, 2007 p.259). However, "a significant part of the relationships is an unidirectional flow from the university and institutions to the firms". (Rapini & Righi, 2006 p. 20). Rapini and Righi (2006) highlight that, even though narrowing and refining collaborative processes between firms and universities, research groups are still restricted to some firms, which presents an opportunity to increase interactions.

2.3 Innovative performance in public educational institutions

The innovation, originated from allocation and use of resources, behavior and activity, should be understood as a contextualized process, which is submitted to factors and dynamics. To generate and manage innovation requires strategy and policies that support the ability to innovate (Quandt, Bezerra & Ferraresi, 2015). Organizational innovation efforts, determinants of innovative performance, are targeted to improve products, process and organizational structure (Gunday, Ulusoy, Kilic & Alpkan, 2011; Quandt, Bezerra & Ferraresi, 2015). Hence, the innovative performance is related to strategy, leadership, culture, organizational structure, process, people, relationship, technological infrastructure, measurement and learning, factors that provide conditions and enable innovation. Among these aspects, the importance of relationships with external agents is highlighted (Quandt, Bezerra & Ferraresi, 2015).

The inherent difficulty to innovative activity refers to the need to identify and measure the determinants. As innovative activities'

parameters there are: research and development (R&D), patents, new products, technology and other factors, related to determination of an innovative performance (Hagedoorn & Cloodt, 2003; Fernandes, Lourenço & Silva, 2014; Quandt, Bezerra & Ferraresi, 2015). Academic environments, according to Oslo Manual, (OECD, 2018), can be considered stimulators of innovative performance, as they focus on stimulating the creation, share and application of knowledge.

A database on research groups is the Statistics Summary from RGD. The Statistics Summary is an instrument that reports and compiles data and information and provides an overview on the installed capacity of research in Brazil (CNPq, 2019), embodying the innovative performance of PEIs. Consequently, using this base, Souza and Castro (2016) verified that the innovative performance of PEIs is related to the amount of PhDs and to the relationships between research groups and firms. With the same base, but through a perspective of remuneration resulting from these relationships, Rapini, Oliveira and Silva (2016) identified the types of remuneration found in the relation between these two spheres. With the results, the authors highlighted that the "motivation to the engagement in cooperative activities between U-F are based in access to complementary sources, knowledge and abilities sharing, as well as the risk of the research activities" (Rapini, Oliveira & Silva, 2016, p.241)

As another example of work resulted from the Statistics Summary by RGD, Souza et al. (2019) identified that the most significant remunerations to the innovative performance of public educational institutions were: 'financial resources transfer from the partner to the group', 'supply of scholarships by the partner to the group', 'transfer of material inputs to the partner's activities', 'temporary physical transfer of human resources from the group to the partner's activities', 'partnership with transfer of any type of resources in both ways' and 'other forms of remuneration that does not fit in any of the previously mentioned'. By using the Statistics Summary of RGD, the authors developed a numeric picture of research groups during the period between 2010 and 2016. The authors collected information about the total number of groups; groups by region; federative unit and big area; quantity of researchers; scientific production; technical production subdivided in software, technological production and process or techniques; groups with relationships; groups by wide area and with relationship; types of relationships; and types of remuneration (Souza et al, 2019).

Shortly, according to the authors, there was an increase of 37% of the quantity of research groups in Brazil, compared to 2010, in other words, there were more than ten thousand groups. The regions North, Northeast, Central-West presented the highest rates of research groups increases: 66.22%, 52.91% and 47.53%, respectively. There was an increase of 7% in the total of national scientific production, however the technological production (software production, technological products and process with and without patents/register/catalogue), showed a decrease of 3%. Regarding the number of researchers, there was an increase of 54.83%, while the number of PhDs researchers increased to 59.24% (Souza et al, 2019). These authors associate this increase as a positive influence factor in the innovative performance of the country.

3 Method

To achieve this research's aim a descriptive, quantitative and documental research was developed, based on data made available by Research Groups Directory of Brazil (RGD) (CNPq, 2019). The RGD refers to an inventory that harbors information about active scientific and technological research groups in Brazil. The collected data refers to researchers, students and technicians of the groups, and to active research lines. RGD also presents the specific knowledge, scientific, technological and artistic productions and data regarding the interactions between research groups and other institutes, specially with the productive sector (CNPq, 2019).

The RGD data show information about the situation of scientific-technological Brazilian activities (CNPq, 2019), which reaffirm this database's relevance to the context of this investigation. By harboring information pertinent to relationships between research groups and firms, this base becomes the main source on it, being chosen for the present research. It is highlighted, therefore, that this information is not found in other databases.

To obtain the types of relationships between research groups and firms that contribute the most to the innovative performance of PEIs, the

tabular plan of RGD was used. The tabular plan aims to set a quantitative profile of research in Brazil, organized in tables in which the user dynamically perform construction and view configurations (CNPq, 2019). However, with the tabular plan being discontinued by CNPq after 2010, the last available census of 2010 was elected to be used. The use of this data is justified by considering it as an extensive set of information that originated from the registration of research groups in CNPq directory, from Lattes database and from CAPES gathering system. Furthermore, Souza et al. (2019) and Souza and Castro (2016) also used this same census in their research on innovative performance.

The main data collected from the tabular plan are: i) educational institution; ii) total groups by educational institution; iii) technical production by educational institution; and iv) types of relationships (Rel) by educational institution (14 types, represented in Table 1). To outline the research sample, 304 public and private institutions registered in the tabular plan were identified. With the purpose of verifying which institutions were public, the e-MEC Register of Institutions and Courses of Higher Education was consulted. Only 118 (39%) of these 304 institutions, composed the final sample of public institutions. Information regarding the administrative category (Federal, state and municipal) and the academic organization (universities, institution, college, center or others) of these public education environments was also added.

As the sample was defined, it was possible to develop multivariate statistics, using the statistical software Statistical Package for the Social Sciences (SPSS). To start the set of analyses, the reliability of the data collected was checked through Cronbach's Alpha. Cronbach's Alpha is composed as a measure of reliability that assesses the consistency of the entire scale ranging from 0 to 1, where the value of 0.60 is considered the lower limit of acceptability (Hair Junior, Black, Babin & Anderson, 2009).

Table 1. Main Types of Relationships between Research Groups and Firms.

Types of Relationships	Quantity of Groups
Rel1 - Scientific research without consideration of immediate use of results	9232
Rel2 - Scientific research with consideration of immediate use of results	8151
Rel3 - Non-routine engineering activities, including the development of a serial head prototype or pilot plant to the partner	1492
Rel4 - Non-routine engineering activities, including the development / manufacture of equipment to the group	1751
Rel5 - Non-routine software development by the partner to the group	1202
Rel6 - Software development by the partner to the group	1249
Rel7 - Transfer of technology developed by the group to the partner	4238
Rel8 - Transfer of technology developed by the partner to the group	3762
Rel9 - Technical consulting activities not covered by the other types	4159
Rel10 - Provision, by the partner, of material inputs for the group's research activities without being linked to a specific project of mutual interest	5096
Rel11 - Provision, by the group, of material inputs for the partner's activities without being linked to a specific project of mutual interest	1652
Rel12 - Training of partner's team by the group including courses and in-service training	4033
Rel13 - Training of groups' team by the partner including courses and in-service training	3573
Rel14 - Other predominant types of relationship that do not fit into any of the previous	6553

Source: CNPq (2019).

After checking the data's reliability, a correlation analysis was performed. The purpose was to measure the rate of association between the variables. Therefore, it was necessary to choose the most appropriate correlation test through the normality test. Hence, the Kolmogorov-Smirnov test was performed, which is indicated when there are more than 30 samples in a database (Mendes & Pala, 2003). With this evaluation, the 14 relationships present a p value lower than the meaningfulness value of 1%, pointing out that all these variables show non-normal distribution. Accordingly, the non-parametric correlation of Spearman is inferred to be the most indicated (Mukaka, 2012). For Bauer (2007), this type of correlation should be developed in order to replace the Pearson's coefficient, when the quantitative data show a joint distribution different from a normal bivariate distribution.

Subsequently, the cluster analysis was applied, through the Ward Hierarchical model based in Maroco (2010) and Malhotra (2011). According to Maroco (2010), this analysis is an exploratory technique that allows clustering

subjects in uniform groups relatively to one or more common features. According to the same author, each observation belongs to a specific group that resembles all other observations of the same cluster, becoming distinct from the other groups' observations. The Ward Method, according to Hair Junior et al. (2009), implies that the distance between two clusters is the sum of the squares between these two sets. Hence, this method aims to minimize the square of the Euclidean distance to the averages of the clusters (Malhotra, 2011). After defining the clusters, the ANOVA test was performed. This test's aim is to probe the cluster's profiles. According to Maroco (2010), the ANOVA (Analysis of Variance) is instrumental to compare measures of two or more populations from which random and independent samples were taken.

As a last analysis, in order to identify the relationships between research groups and firms that contribute the most to the innovative performance, the discriminant analysis was applied. The discriminant analysis is a technique where the dependent variable is categorical, or qualitative, and the independent variables are metric, or quantitative (Hair Junior et al., 2009; Malhotra, 2011). To apply this technique its assumptions were met. Accordingly, it sought to verify the presence of outliers and homogeneity of variance-covariance matrices. To verify the outliers, the Mahalanobis Method was used. This method points out atypical observations in the sample (Hair Junior et al., 2009). As a result, the method showed the presence of outliers. Albeit, after analyzing each atypical observation, it was decided to keep the sample, under the justification that its exclusion would affect the final results, that is, in Cluster 3. In other words, important institutions with high U-F interaction would be taken out from the sample, for example the University of São Paulo. Keeping the PEIs with high interaction reveals the entities with higher innovative performance potential.

The Levene Test was applied in the analysis of the matrix homogeneity of variance-covariance. This test evaluates if the variances of a single metric variable are the same in any number of groups (Hair Junior et al., 2009). To operate it, it was set as the null hypothesis that the clusters were uniform. The Levene test results were not significant, discarding the alternative hypothesis that at least one of the clusters presented a different variance. Hence, there was not enough statistical evidence to affirm the clusters had different variances.

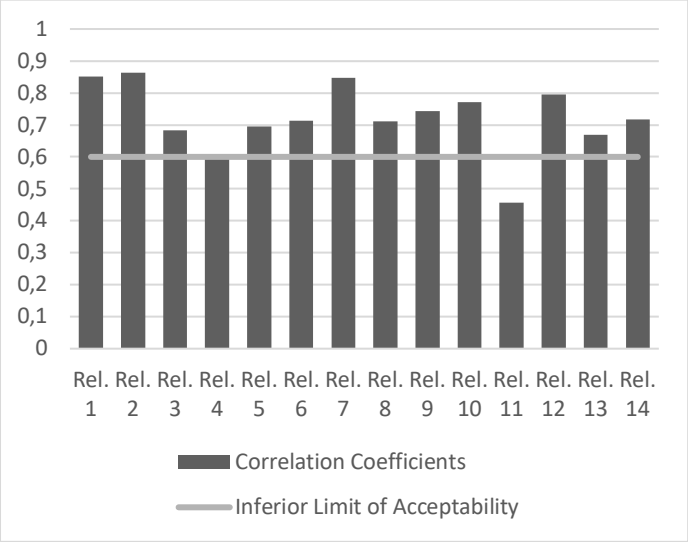
Based on these tests, it was possible to proceed to the discriminant analysis. So the 3 clusters were considered as dependent variants and, as independent variants, the 14 types of relationships, in order to evidence, between these variables, the most significant. The Stepwise Method (by stages) was chosen, because it is the most common and estimates the discriminant functions. In other words, the independent variables enter sequentially according to the discriminatory power that they add to the accuracy of a group's relevance.

4 Relationships of Research Groups involving Firms and Innovative Performance

Para iniciarmos a aplicação das técnicas To start the implementation of multivariate techniques, it was necessary to verify the reliability of the collected data from the Tabular Plan. Therefore, the Alpha Cronbach analysis points out the value of 0.903, a value that, according to Hair Junior et al. (2009), is above the lower limit of acceptability. A high data reliability was, consequently, verified.

Subsequent to the implementation of statistical techniques, the Spearman Correlation was conducted. The correlation was performed on the association of 14 types of relationships and the innovative performance (technical production). Based on the results, Figure 1 was developed, showing strong positive correlations (between 0.7 and 0.9) for relationships 1, 2, 6, 7, 8, 9, 10, 12 and 14; moderate positive (between 0.5 and 0.7) for relationships 3, 4, 5 and 13; and weak positive for relationship 11, as indicated by Mukaka (2012). Only relationship 11 stood under the lower limit of acceptability, with the value of 0.456. However, it was decided to keep it, since it was understood that it could be important to the study.

Figure 1. Correlation coefficient of the types of relationship with innovative performance.



Source: Developed by the authors.

According to Figure 1, the results point out that the 14 relationships have a positive association with the innovative performance of PEIs, similar to Souza and Castro's (2016) study. This study verified that, in addition to the PhDs quantity, the quantity of relationships between research groups and firms assume high discriminatory importance to the promotion of innovation at those institutions. After identifying the relation degree of the relationships with the innovative performance, the Cluster Analysis was applied to the relationships' data. The aim of this application was to verify the clusters created by the quantity of relations obtained between research groups and firms. This application was based on the work of Souza and Castro (2016). However, it is important to mention that this study did not show which institution presents a higher or lower quantity of relationships; and the types that contribute to the innovative performance of PEIs. As a result three clusters were formed: Cluster 1 showed 84 PEIs (71% of total), Cluster 2 showed 25 PEIs (21% of total), and Cluster 3 showed 9 PEIs (8% of total).

To deepen these clusters' profiles, the ANOVA was applied. The ANOVA test relates the clusters to the administrative categories, academic organization, quantity of research groups, technical production and quantity of relationships. As the null hypothesis, it was set that there is no distinction between the clusters. The results revealed that the variables "quantity of groups", "technical production" and "quantity of relationships" were relevant to 5%, according to Hair Junior et al. (2009). Table 2 presents the relation of these variables and the relationship between research groups and firms. The other variables were dismissed, as they were not significant.

Regarding the presented results, it was possible to establish the predominant profile of each cluster. Cluster 1 is composed by institutions with a low quantity of research groups, technical production and relationships. It was consequently named 'Low average of relationships between research groups and firms'. In Cluster 2 the profile mostly corresponds to institutions with a high quantity of groups, but a low technical production and average quantity of relationships. This cluster's label was named as 'Moderate average of relationships between research groups and firms'. Lastly, Cluster 3 is composed of institutions with a high quantity of groups, technical production and relationships. It was named as 'High average of relationships between research groups and firms'.

Table 2. Relationship Clusters' predominant profiles.

	***Cluster* 1**	***Cluster* 2**	***Cluster* 3**
Number of Public Educational Institutions	84 Institutions	25 Institutions	9 Institutions
Quantity of groups	Low quantity of research groups[1]	High quantity of research groups[2]	High quantity of research groups[2]
Technical Production	Low technical production[3]	Low technical production [3]	High technical production[4]
Quantity of Relationships (Total of 14 relationships)	Low quantity of relationships [5]	Average quantity of relationships[6]	High quantity of relationships [7]

Note. (*) The values were classified based on the cluster analyses; [1]lower than 247 research groups; [2]above 247 research groups; [3]lower than 446 technical production per PEI; [4]above 446 technical production per PEI) regarding 17 PEIs (15% of total); [5]An average of 23 relationships per institution.; [6] An average of 134 relationships per institution; [7] An average of 490 relationships per institution.
Source: Developed by the authors**.**

Some inferences based on the results mentioned above are presented. By considering the clusters' profile along with the Spearman correlation and the results of Souza and Castro (2016), the direct association between technical productivity and

relationships between research groups and firms can be validated. It was noted that only one group, Cluster 3, presents a high quantity of relationships, where 9 institutions have a high quantity of public-private partnerships. The other 109 Brazilian higher education institutions have low or average quantity of partnerships between research groups and firms, resulting in lower quantity of technical productions. Such results validate the affirmative that, in fact, the public-private partnership optimize the technical production and the innovative performance of the institutions (Quandt, Bezerra & Ferraresi, 2015; Rapini, Oliveira & Silva 2016; Souza & Castro, 2016; Souza et al., 2019). Table 3 demonstrates the PEIs ranked at each cluster.

Table 3. Ranking of PEIs according to Clusters' Relationships.

Clusters	Institutions
Low average of relationship between research groups and firms	UFAC; IFAL; UFAL; UNCISAL; UNIFAP; IFAM; UEA; UFAM; IFBA; UEFS; UESB; UESC; UFBR; IFCE; UECE; URGA; UVA-CE; IFB; IFG; IFGoiano; UEG; UEMA; UFMA; IFMT; UNEMAT; UEMS; UFGO; UFMS; UEMG; IFSEMG; IFTM; UEMG; UFJF; UFSJ; UFTM; UFVJM; UNIFALMG; UNIFEI; UEM; UENP; UEPG; UNESPAR; UNICENTRO; UEPB; UFPB; IFPA; UEPA; UFOPA; UFRA; IFSertõesPE; IFPE; UFRPE; UNIVASF; UPE; IFPI; UESPI; UFPI; UERN; UFERSA; FURG; IFFarropilha; IFRS; UNIPAMPA; CEFET/RJ; IFRJ; IME; UENF; UFRRJ; UNIRIO; IFRO; UNIR; UFRR; IFCatarinense; IFSC; UNOESC; IFS; UFS; FAMERP; ITA; UNITAU; UFT; e UNITINS.
Moderate average of relationship between research groups and firms	UFBA; UNEB; UFC; UNB; UFG; UFMT; CEFET/MG; UFLA; UFOP; UFU; UEL; UNIOESTE; UTFPR; UFCG; UFPA; UFRN; UFPEL; UFSM; UERJ; UFF; FURB; UDESC; UFSCAR; UNICAMP; e UNIFESP.
High average of relationship between research groups and firms	UFMG; UFV; UFPR; UFPE; UFRGS; UFRJ; UFSC; UNESP; e USP.

Note: The PEIs were classified according to their Federative Unit.

Source: Developed by the authors.

On the analysis of Table 3, it is verified that the Federal Universities from Minas Gerais, Paraná, Pernambuco, Rio Grande do Sul, Rio de Janeiro and Santa Catarina, and the State ones from São Paulo were the ones with the highest quantity of relationship. Therefore, it was indicated the need for future research that analyzes these institutions and the reason why they present more relationships regarding innovative performance. Finally yet importantly, it was noted that, except for UFV, the other institutions are from Brazilian state capitals. As such, it is indicated to understand how location affects the innovative performance of educational institutions.

After setting the PEIs' clusters, the aim was to identify the relationships that most interfered with the cluster's distinction. To achieve this, the discriminant test was applied. It was set, therefore, as a dependent variable, the three obtained clusters and, as independent variables, the 14 types of relationships. It was accepted as the null hypothesis the non-distinction between the clusters (low, moderate and high average of relationships). The results of the discriminant test presented the rejection of the null hypothesis, indicating that there are differences between the clusters, with 1% of significance level by the Wilks' Lambda test. The discriminant test revealed that the relationships that most discriminate the clusters, according to Stepwise Method, are, in descending order: relationship 7 (Technology transfer developed by the group to the partner), relationship 5 (Non-routine software development by the partner to the group); relationship 4 (Non-routine engineering activities including the development/manufacture of equipment to the group); and relationship 2 (Scientific research with consideration of immediate use of results).

The discriminant function showed a Canonical Correlation Coefficient of 0.941 for the first discriminant function; 0.494 for the second one, which, in other words, indicates a high degree of association between the function and the analyzed clusters. Finally, the results also showed that 94.9% of PEIs were correctly classified inside the clusters, which means a high percent of classification consistency.

These results complement the research of Rappini and Righi (2007). In its turn, the authors verified that there was a concentration of mutual interest relationships (74% and 92% respectively), from the universities to the firms during the period

between 2002 and 2004. This result contributes to the relevance of relationships 7 and 2 and their discriminant function values. Rapini and Righi (2006, 2007) also showed that the most frequent U-F relationships were: scientific research with considerations of immediate use, with 30.3% (relationship 2); transfer of technology developed by the group to the partner, with 17% (relationship 7) and scientific research without considerations of immediate use of the results, with 15.7% (relationship 1). On the other hand, among the most frequent relationships between firms and research groups were: relative leadership of technology transfer, in 2004 (relationship 8), in the face of non-routine engineering activities in 2002, associated to the early stages and definition of projects (relationship 4); and the relationship of software development that obtained the highest expressiveness by research groups to the firms (relationship 6).

Summarizing, it was noted that the relationships discriminated in this study are similar to those of the studies above mentioned. However, the only different relationship was the development of non-routine software by the partner to the group (relationship 5), in opposition to the development of non-routine software by the group to the partner (relationship 6). This divergence is justified by understanding that this result could be caused by the tabular plan update. Lastly, Table 4 demonstrates the relation between the clusters and the discriminated types of relationship.

Table 4. Relation between the Clusters and the Most Significant Relationships (by Numerical Order).

	***Cluster* 1**	***Cluster* 2**	***Cluster* 3**
Rel. 2	High quantity of PEIs with low relationship rate 2 (from 0 to 44 rel.)	Average quantity of PEIs with average relationship rate 2 (from 11 to 72 rel.)	Low quantity of PEIs with high relationship rate 2 (from 112 to 264 rel.)
Rel. 4	High quantity of PEIs with low relationship rate 4 (from 0 to 2 rel.)	Average quantity of PEIs with average relationship rate 4 (from 0 to 4 rel.)	Low quantity of PEIs with high relationship rate 4 (from 3 to 27 rel.)
Rel. 5	High quantity of PEIs with low relationship rate 5 (from 0 to 1 rel.)	Average quantity of PEIs with average relationship rate 5 (from 0 to 7 rel.)	Low quantity of PEIs with high relationship rate 5 (from 1 to 10 rel.)
Rel. 7	High quantity of PEIs with low relationship rate 7 (from 0 to 16 rel.)	Average quantity of PEIs with average relationship rate 7 (from 4 to 39 rel.)	Low quantity of PEIs with high relationship rate 7 (from 44 to 93 rel.)

Source: Developed by the authors.

It was noted that the clusters are different in terms of the quantity of relationships obtained in the listed ones (2, 4, 5 e 7). In other words, the cluster with low relationship rate between research groups and firms shows few relationships of types 2, 4, 5 e 7. Similarly, the cluster with average relationship rate between research groups and firms shows a moderate quantity of these types of relationships. Finally, the cluster with high relationship rate between research groups and firms shows a high quantity of relationships of these types, mainly the 2, 4, 5 and 7. The only exception was relationship 5, regarding high relationship rate between research groups and firms (Cluster 3), showing an average quantity of relationship 5. Hence, the results infer that the greater the frequency of relationships 2, 4, 5 and 7, the better it would be the position of PEIs in the clusters and as a high innovative performance institution. This result is also confirmed by research of Rapini and Righi (2006; 2007).

Summarizing, the results demonstrate that certain types of U-F relationships have higher influence on the innovative performance of PEIs. These relationships are present, mainly, in the PEIs of the third cluster, which show, in fact, higher quantities of interaction between the productive sector and universities. Lastly, the findings mentioned can be a source of inspiration for many authors in this context, as it will be mentioned at the final considerations section.

5 Conclusion

According to the aim of identifying the relationships that contribute the most to the innovative performance of PEIs, three institution groups were found that show low, moderate and high average of Relationship between research groups and firms. Based on these, it was verified

that the relationships of type 7 (Transfer of technology developed by the group to the partner), 5 (Development of non-routine software by the partner to the group), 4 (Non-routine engineering activities, including development/manufacture of equipment to the group) and 2 (Scientific research with considerations of immediate use), respectively, were the most relevant relationships, since they optimized the innovative performance of Brazilian PEIs. These results emphasize the claim that, by supporting certain types of relationships, it is possible to have an increase in PEIs' innovative potential. This data corroborates the one pointed out by Schaeffer, Ruffoni and Puffal (2015) which reinforces the idea of transcending the "interaction points" between universities and firms. To the authors, there is a need to not only value this relationship quantification, but also the quality of these interactions so they can generate knowledge and innovation dissemination.

However, as much as supporting some relationships can lead to increased innovative performance, it is emphasized that the relationships by themselves are not the single factor to obtain such performance. Besides institutional aspects, such as those highlighted on the Triple Helix theory, it is also necessary that the Brazilian government support the public-private partnership, developing actions to promote and support it. The results must be evaluated with caution as, according to Rapini, Oliveira and Silva (2016), there are different performances of the research groups in Brazil. In addition, Souza and Castro (2016) identified that, besides the relationships between research groups and firms, the variable "quantity of PhDs" affects innovative performance.

As the first limitation of this study is the fact that data of the tabular plan is only available up to 2010. The contact with CNPq revealed that this absence of update was not casual. However, regarding the great contribution verified by the collection of data and reinforced by these study results, the importance of tabular plans to understand the research development in Brazil is highlighted. It would be a great value if CNPq rethinks the decision of suspending the tabular plan, since the census by itself does not add value to this study regarding innovative potential. The second limitation is associated with the fact that RGD does not present, categorically, better details regarding the types of relationship, making it difficult to deepen the understanding of interactions. Finally, as the last limitation, the absence of additional innovation bases that could subsidize the results obtained here is pointed out. The next topic describes new conclusions showing the implications and agenda for future studies.

6 Implications and Future Research

As theoretical contributions, it is highlighted that this study results describe the operation of the Triple Helix. The Triple Helix operation reflects current structures with complex roles and relations, which covers highlighted gaps in critics to the model (Mineiro, Souza & Castro, 2018). Furthermore, the results point out key aspects to each of the three actors of Triple Helix. Regarding the government, the need for specific definitions of national support to encourage Triple Helix is reinforced, particularly the specific U-F interactions. Hence, with the absence of definitions to support the results from U-F interactions, it is not possible to mitigate the benefits. Accordingly, studies can analyze the current public policy actions regarding the relationships highlighted here, pointing out gaps and new practical orientation. About the productive sector, the findings show that U-F interactions can sustain improvements on regional, national and international competitiveness. These results can be discussed in light of open innovation. Finally, some questions related to the universities still need to be answered, such as: how can these relationships be handled as an open innovation source? And how can both parts, U-F, benefit in open innovation analyses?

As social contributions, it is highlighted that these results can support the development of innovations that generate solutions to environmental and social issues. Besides that, by reinforcing the importance of the University for human and intellectual development, it has the opportunity, with the results shown here, to improve the actions of universities. As practical contributions to the PEIs, it is argued that the results found can help them determine innovative ways that should be based on development and technology transfer and on conducting research oriented to practice. Consequently, it is possible for universities and research institutions to better support definitions of essential expertise (training of qualified labor) through the development of research groups, reinforcing their benefits in

academic, scientific, professional, social and operational terms. Lastly, practical contributions can arise from analyses of key aspects of relationship forms, highlighting reviews and improvements of the current laws regarding interactions between the public and private sectors.

Besides the indications for future research mentioned above, the new verification of the scope of this work is named, in case the tabular plan is updated. Due to the limitation of categorical specifications of the relationships, it is indicated to understand, qualitatively, the perspective of the groups' manager, pointing out their difficulties, needs and opportunities of interaction. Finally, the results are yet to be studied regarding the models of Quadruple (society) and Quintuple Helix (environment).

Acknowledgements

The authors would like to thank the Federal University of Lavras (UFLA), the University of São Paulo (USP), the Coordination for the Improvement of Higher Education Personnel (CAPES), and the Minas Gerais Research Funding Foundation (Fapemig) for their support.

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Authors' contribution:

Author 1: set the aim and research method, took part in the theoretical background, managed the statistical techniques and developed the result analysis.

Author 2: set the research's aim, took part in the theoretical background and developed the conclusion.

Author 3: supervised the work, reviewed the statistical techniques and proposed improvements.

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Experience with Brands and Perceived Quality in Most Remembered Medicines

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KEYWORDS

Perceived quality, brand, customer experience, most remembered brand.

Received 29.03.2021
Reviewed 22.05.2021
Accepted 31.05.2021

ISSN 1980-4431
Double blind review

ABSTRACT

This work aimed to analyze a customer experience with the brand and if it has a positive effect on the perceived quality of the medicines. The non-probabilistic sample included the participation of 209 individuals, who answered the questionnaire available on the electronic platform regarding Google Forms through social networks. To meet the central objective of this study, i.e., to test the hypothesis of the relationship between the experience of the drug brands and the perceived quality, equation modeling was used, even using the PLS-Sem statistical tool. The results achieved demonstrated the existence of a relationship between the experience of the brands with the perceived quality with a positive and predictive average effect, in addition, the results also showed that moderated by gender, the female coefficient increased whereas the male was not significant.

PALAVRAS-CHAVE

Qualidade percebida, marca, experiência com a marca, marca mais lembrada.

RESUMO

O objetivo deste trabalho envolve analisar a experiência do cliente com a marca e se essa tem um efeito positivo na qualidade percebida dos medicamentos, quando moderados pelo gênero. A amostra não probabilística contou com a participação de 209 indivíduos, que responderam ao questionário disponibilizado, em plataforma eletrônica *Google forms*, por intermédio das redes sociais. Para atender o objetivo central deste estudo, ou seja, testar a hipótese da relação entre experiência das marcas de medicamentos e a qualidade percebida, se recorreu à modelagem de equações por meio da ferramenta estatística PLS-Sem. Os resultados alcançados demonstraram a existência da relação entre a experiência das marcas com a qualidade percebida com efeito médio positivo e preditivo, ademais, os resultados mostrarão que moderados pelo gênero, se aumenta o coeficiente do feminino enquanto o masculino não foi significativo.

1 Introduction

The basic rule of all purchase is related to the reason for an exchange which is satisfied by a product of reasonable or expected value. Thus, the delivery with a superior perceived quality is considered one of the biggest challenges in marketing strategies of organizations (Slater & Narver, 2000; Snoj, Pisnik Korda, & Mumel, 2004).

In this sense, the brand is an important component for consumer decision-making, as it differentiates a product or service from other competitors, protecting the buyer of similar products (Aaker, 1992; Hakala, Svensson, & Vincze, 2012; Kotler & Keller, 2012). Therefore, this difference is what makes the consumer to choose products of a brand, as well as the marketing actions for brand recognition define its value (Datta, Ailawadi, & Van Heerde, 2017; Yoo, Donthu, & Lee, 2000).

In addition, brand equity also includes perceived quality, which is defined by the consumer's judgment about the superiority or excellence of a product (Zeithaml, 1988). Perceived quality is the comparison between consumer expectations and the actual performance of a brand (Snoj at al., 2004).

Thus, the recognition of the quality of a brand, provided by the surpassing of consumer expectations, may strengthen consumer expectations regarding the brand (Aaker, 1992; Zeithaml, 1988).

The variables that influence this consumer's expectation with the brand may differ between consumers with high perceived quality and consumers with low perceived quality (Calvo-Porral & Lévy-Mangin, 2017).

Although there is a lack of research on the relationship between brand experience and the quality of brand perception (Pina & Dias, 2020), studies have pointed out the significance of the relationship with a questionnaire applied to Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs) of Swedish companies (Biedenbach & Marell, 2010), with Iranian health insurance customers (Eslami, 2020), even as with triple play telecommunications users in Portugal (Moreira, Silva, & Moutinho, 2017) and with 333 Nespresso customers, who answered an internet questionnaire (Pina & Dias, 2020). Not being found in the searches across the bases EBSCO, Scielo and Google Scholar, it could be found that articles were associated with the genre moderating the relationship between experience with the brand and perceived quality and, similarly, with medicines as the object of research. Furthermore, what differentiates this research is the simplicity of the theoretical model, making room for its improvement.

Thus, brand recognition and the consumer's experience concerning the products or services of that brand matter are listed in the following question: does the customer's experience with the brand have a positive effect on the perceived quality of medicines, when moderated by gender? To answer the question, the objective aimed to analyze the customer's experience with the brand and whether this had a positive effect on the perceived quality of drugs moderated by gender.

This work intended to fill the gap that demonstrates this relationship, making use of Confirmatory Factor Analysis (CFA) (Partial Least Squares-Structural Equation Modeling (PLS-SEM)), to prove or not the hypothesis that the customer's experience with the brand had a positive effect on the perceived quality of medicines.

2 Theoretical model

This section discussed the constructs that make up the proposed theoretical model, as well as the hypotheses provided for in the research.

2.1 Consumer behavior

More and more, market administration scholars seek to understand the phenomena that lead the consumer how to decide to buy, based on social, demographic, economic, psychological and customs factors, among others (Levrini & Maciel, 2016). In this sense, “buying behavior involves mental and emotional activities during the purchase or use of products that satisfy the consumer's needs or desires” (Mattei, Machado, & Oliveira, 2008, p. 27).

Consumer behavior is also influenced by cultural factors, when the individual is strongly influenced by the family and institutions regarding the values of their country or region; social, when it is influenced by the family cycle, friends, colleagues, i.e., by affinity groups; personal, such as: age, financial conditions, personality, among

others and; psychological factors, such as motivation, perception, learning and memory (Kotler & Keller, 2012).

In summary, consumer purchases are extremely influenced by cultural, social, personal and psychological characteristics (Souza et al., 2016), being internal and external factors that determine consumer behavior in pursuit of satisfying a need (Castro, Pitombeira, Ferreira Neto, Caetano, & Silva, 2020).

2.2 Brand

For centuries, the brand served simply to identify the producer and his/her products, differentiating one manufacturer from another (Scharf, Soriano-Sierra, & Prim, 2007). Currently, the brand represents a good or service, serving to differentiate itself from other developed products or services, adding dimensions that satisfy the same consumer needs (Kotler & Keller, 2012).

A trademark is a name and/or distinctive symbol (such as a logo, trademark or packaging design) designed to identify the products or services of a seller or a group of sellers and differentiate those products or services from competitors. Thus, a brand signals the source of the product to the customer and protects the customer and the producer from competitors, who would try to provide products that look identical (Aaker, 1992).

The brand is related to a synthesis of the good and the bad, transforming itself into a symbolic and effective link between the products that this is offered to the consumers, and that it is intended for. By absorbing ephemeral images and sensations, the brand becomes a concept, when even slightly it is appreciated and recognized, occupying a part of the consumer's memory (Mello & Gouvêa, 2014). Due to these characteristics, it is up to the Marketing area to manage the brand, in addition to being the most valuable asset in a company, seeing that it generates intense customer loyalty with the brand (Kotler & Keller, 2012).

A strong brand identity is communicated through consistent communication over the years (Hayes, 2015). The consistency of the message leads the consumer to easily assimilate and identify the brand's position and symbols in various communications, such as in the launch of other products, services, events and others (Aaker, 2003; Keller, 2011).

Brands bring a unique meaning to consumers, and this meaning resulting from a personal experience with the brand can create an emotional connection and a relationship between consumer and brand (Elyria, Ravi, & Enrique, 2014).

Brands represent extremely valuable pieces of legal ownership, capable of influencing consumer behavior, being bought and sold, and providing the security of sustained future revenue for their owners. The value added, directly or indirectly, by these various benefits is often called brand equity (Keller, & Brexendorf, 2019).

In this sense, brand equity can be defined as the difference in consumer choice between a focal brand product and a non-branded product, considering the same level of product features. This definition deals with the comparison of two products, which are identical in every respect except the brand name (Yoo et al., 2000). In the same sense, brand equity is the preference and differential response to the marketing effort that a product obtains as a result of its brand identification. Brand equity can be measured using consumer perceptions or sales (Datta et al., 2017).

Thus, brand equity includes five assets as following: a) brand loyalty; b) brand recognition; c) perceived brand quality; d) brand associations; e) other proprietary brand assets, eg patents, trademarks, channel relationships (Aaker, 1992).

However, according to Lassar, Mittal and Sharma (1995), there are five important considerations to define brand value. First, brand equity refers to consumer perceptions, not to any objective indicators. Second, brand equity refers to an overall value associated with a brand. Third, the overall value associated with the brand is derived from the brand name and not just from the physical aspects of the brand. Fourth, brand equity is not absolute but relative to competition. Finally, brand equity positively influences financial performance.

Thus, a high brand equity implies that customers are familiar and have many positive, strong and unique associations in memory related to the brand, perceive that the brand is of high quality and are loyal to the brand (Yoo et al., 2000; Hakala et al., 2012).

Therefore, brand equity is a central construct in marketing theory and practice. Companies invest

considerable efforts over many years to build their brand equity. These companies reap the benefits of this investment in the product market and financial market outcomes and leverage their brand value to introduce brand extensions (Datta et al., 2017).

For the authors Cravens & Guilding (2001) there are several ways to evaluate a brand and there are several reasons why organizations evaluate brands, which can be the following: for financial reporting, acquisitions or mergers; corporate strategies for evaluating the management of brands, from the brand portfolio; and the brand can be measured by the perceived quality, which can be understood as delivering a product or service that exceeds the customer's expectations.

In this sense, quality is not something static, it is linked to the perception, by the consumer, and their expectations regarding that product or service (Aaker, 1992; Zeithaml, 1988).

2.3 Perceived quality

In this sense, quality can be broadly defined as superiority or excellence. By extension, perceived quality can be defined as the consumer's judgment about the general excellence or superiority of a product or service in relation to the intended objective (Aaker, 1992; Zeithaml, 1988). Perceived quality generates value, providing a reason to buy, as well as differentiating the brand, attracting the interest of channel members, being the basis for line extensions and supporting a higher price, thereby generating predictable sales and profits (Aaker, 1992) .

Furthermore, the quality of a product is assessed as high or low, depending on its excellence or relative superiority between products or services, which are seen as substitutes by the consumer (Zeithaml, 1988). Therefore, it is based on subjective assessments of product quality, by consumers or users and not by managers or specialists (Yoo & Donthu, 2001). Thus, the perceived high quality would lead a consumer to choose a certain brand over other competing brands. Therefore, as brand quality is perceived by consumers, brand value will increase (Yoo et al., 2000).

Perceived quality measures the subjective judgment of consumers about the overall excellence or superiority of a brand and addresses overall quality rather than individual elements of quality (Yoo et al., 2000). Thus, the perceived quality of the product is a critical issue for producers and marketers, as the perceived quality can offer an opportunity for differentiation (Konuk, 2018).

Therefore, brand recognition, perceived quality, and brand associations can strengthen brand loyalty, even as increasing customer satisfaction and providing reasons to buy products (Aaker, 1992).

Previous works sought to demonstrate the relationship between brand experience and perceived quality, for instance, Pina and Dias (2020) tested the relationships between brand experience with loyalty, perceived quality and brand associations moderated by gender, however, the moderation was not significant. In Klabi's work (2020) the hypothesis that brand experience moderates or amplifies the effect of self-image congruence on perceived quality was tested. The hypothesis of service quality moderating the relationship between brand experience and brand love was verified in the study by Prentice, Wang and Loureiro (2019).

2.4 Brand experience

Marketing traditionally focuses on studying the physical aspects of products and services, such as functionality, price, availability or quality (Iglesias, Singh, & Batista-Foguet, 2011). However, research shows that consumers do not just buy products or services, they buy relationship (Berry, Carbone, & Haeckel, 2002) and value (Ravald & Grönroos, 1996). Furthermore, marketing scholars have found that customer experience is the key issue to be managed (Berry et al., 2002).

In this sense, to reduce risk in decision-making, consumers rely on brand value, which consists of being able to assign responsibility to a specific manufacturer or distributor, simplifying decision-making and reducing risks. A brand signals a certain level of quality so that satisfied customers may choose products again (Hakala et al, 2012).

Thus, customer experiences are an internal and subjective response to any direct contact, which usually occurs during purchase, use and service and is usually initiated by the customer, or indirect contact, which especially involves meetings unplanned with representations of a company's products, services or brands and takes the form of recommendations or word-of-mouth criticism, advertising, reporting, analysis, and so on (Meyer & Schwager, 2007).

Before trying out a service or good, customers should rate it primarily based on their perception of the brand name. However, once customers have the opportunity to try the product, they receive additional information that is even more integrated into their perception of quality (Biedenbach & Marell, 2010). In this sense, the customer experience is defined as the cognitive recognition or perception, which follows from the stimulated motivation of a customer, who observes or participates in an event, being a method that generates a bond between the customer and the product and provides a memorable experience for the customer, adding value to the product (Chen & Lin, 2015).

All aspects of brand experiences are triggered when people seek, buy, consume, evaluate, and even remember products and services (Brakus, Schmitt, & Zarantonello, 2009). Brand experiences arise directly from physical clues, such as a store's physical environment, salespeople, and company practices. These experiences are also indirectly associated with websites or advertisements (Hui & Bateson, 1990).

Furthermore, the quality of the consumer's relationship with the brand refers to the degree to which the consumer perceives that their relationship with the brand meets their expectations (Oliveira, Caetano, & Coelho, 2017).

The brand experience is related to, however distinct from, associative, evaluative and affective constructs of the brand, such as brand personality, brand involvement, attitudes and brand attachment, being a more holistic evaluator of a brand from the consumer's perspective (Brakus et al., 2009).

Before trying out a service or good, customers should primarily evaluate it based on their perception of the brand. However, as soon as customers have the opportunity to try the product, they receive additional information that further integrates their perception of quality (Biedenbach & Marell, 2010).

Experiences happen whenever a customer interacts with a brand-related stimulus. Service quality is linked to customer interaction, such as personal support or empathy. It is predictable that the provision of positive experiences, through interaction with the personal brand or a positive service judgment, will lead to an increase in the perceived quality of a service that exceeds customer expectations (Moreira, Silva, & Moutinho, 2017).

In this context, in the survey conducted with 647 respondents, Biedenbach and Marell (2010) tested the hypotheses that the customer experience had a positive effect on perceived quality, another confirmed hypothesis was the positive relationship between the experience with the brand and its recognition, consumer reminder. In this sense, the following hypothesis was hypothesis:

H1 - The customer's experience with the brand had a positive effect on perceived quality.

Women and men assessed shape quality differently using extrinsic, intrinsic, appearance and performance cues (Gitimu, Workman, & Robinson, 2013). Gender differences in the perception of quality affected customer satisfaction more strongly for women than for men (Wang & Kim, 2019). Therefore, in this case there was the following hypothesis:

H2 - Gender moderated the relationship between brand experience and perceived quality.

Figure 1 represents the structural model of the study, graphically, demonstrating that the perceived quality is influenced by the customer's experience with that brand.

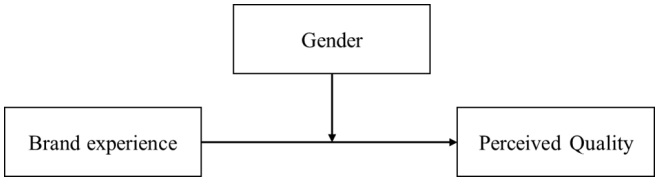

Figure 1 – Structural research model

3 Method and Research Procedures

It was a quantitative, correlational research, with a study of two or more variables, descriptive, causal, which sought to understand the existing relationship, and explanatory that aimed to answer questions related to the perceptions of the participants, type field research, with the data collection developed through questionnaires in a sample of university students (Cooper, & Schindler, 2016).

To meet the aim of this study, the non-probabilistic and convenience sample had the participation of 209 individuals, who were asked to participate voluntarily through social networks, as long as they were over eighteen years old, and the sample was derived from the snow ball sampling technique, a model in which people transfer the research to others, and those to others, thus forming a snowball (Cooper, & Schindler, 2016).

Initially, a secondary survey was carried out using academic search sites to locate articles and/or books that support the framework of this work. The Euromonitor International database was also used to identify the drug brands, which led the national ranking, the which are: Allegra; Benegrip; Cimegripe; Coristina; Decongex Plus; Expec; Halls; Naldecon; Valda; and Vick.

Then, the questionnaire was available on Google forms in the month of April/2020, and this form needed to be answered.

The questionnaire was formed by demographic variables, with experience with the brand with answers between 'yes' or 'no', the perceived quality with answers in the form of a Likert-type scale, ranging from: totally disagree and totally agree; and which was the most remembered brand, according to determined in Table 1.

Table 1
Research instrument.

Construct Brand	Item	Question	References
Top of mind	P1	What brand name drug that first came to mind?	The authors (2020)
Brand experience	P2 P3	Have you ever bought a branded product?	Yoo e Donthu, (2001)
	P4	Have you already bought another branded product? Do you currently use/own any branded products?	
Perceived quality	P5.1 P5.2 P5.3 P5.4 P5.5 P5.6	The product brand was of high quality The likely product quality was extremely high. The likely functionality of the product was too high The likely reliability of the product was very high. The product brand was of good quality The branded product appeared to be of low quality (I)	Yoo *et at.*,(2000)
Social	P6 P7 P8 P9	Gender What was your age group? What was your education? What was the family income?	The authors (2020)

Data were tabulated in an Excel ® spreadsheet and exported to IBM® SPSS® Statistics, version 20, for descriptive statistics calculations, and to Smart PLSSEM, version 3.2.9, used for structural equation modeling (Ringle , Wende, & Becker, 2015). Furthermore, the PLS-SEM operated as a multiple regression analysis, which made it particularly valuable for exploratory research purposes, and its use is indicated when recording: a) abnormal data; b) small samples and; c) formative constructs (Hair, Sarstedt, Hopkins and Kuppelwieser, 2014).

In order to meet the assumptions of the confirmatory factor analysis, variable P5.6 was excluded, as it had a low factor loading.

4 Analysis of Results

In this section, the data were analyzed and the results discussed and, in some cases, confronted with the literature that supports this article.

Therefore, as shown in Table 2, 54.5% of respondents were female, the predominant age group was from 30 to 37 years old, and 37.3% were

postgraduates. The identified income was higher than five (5) minimum wages for 43.5% of respondents, and of those who received this income, 85% had at least a college degree.

Table 2
Demographic data

Variables	Description	Frequency
Gender	Male	45.5%
	Female	54.5%
Age Group	Up to 21 years old	13.4%
	From 22 to 29 years old	30.1%
	From 30 to 37 years old	32.1%
	From 38 years onwards	24.4%
Education	Fundamental	2.9%
	Medium	34.9%
	Higher	24.9%
	Graduate	37.3%
Income	Up to 1 minimum wage (SM)	8.6%
	Above 1 to 3 SM	25.8%
	Above 3 to 5 SM	22.1%
	Above 5 to 10 SM	20.5%
	Above 10 SM	16.7%
	No income	6.3%

Table 3 shows the drug brands most remembered by the survey participants when they answered: which drug brand that first came to your mind?

The three most common measures of brand awareness are known as premium awareness, assisted and unassisted (Laurent, Kapferer & Roussel, 1995). All measures suggested the brand, with differences concentrated in the nature and responsiveness of the consumer (Romaniuk, Wight, & Faulkner, 2017). In this case, the research took place with the help of the list containing the ten brands most remembered by Brazilians in the segment of medicines for coughs and allergies.

Table 3
Most remembered medicine brand

Brand	Quantity	Percentage
Benegrip	59	28.2
Vick	47	22.5
Allegra	38	18.2
Cimegripe	15	7.2
Coristina	15	7.2
Decongex Plus	14	6.7
Naldecon	9	4.3
Valda	5	2.4
Expec	4	1.6
Halls	3	1.4

As shown in Table 3, Benegrip was the drug brand most remembered by respondents. Benegrip is an analgesic and antipyretic, symptomatic medication for the treatment of flu and cold, being marketed in three types of products: Benegrip (6 tablet blister), Benegrip Multi (vial with 240 ml) and Benegrip (20 tablet box), produced by Hypera Pharma.

Table 4 presents the respondents' overall shopping experience. It is noticed that the choice of brand was based on the respondent's experience.

Table 4
Shopping experience - general

Variable	Yes	No
P2 - Have you ever bought a branded product?	89.5%	10.5%
P3 - Have you already bought another branded product?	63.2%	36.8%
P4 - Do you currently use/own any branded products?	65.6%	34.4%

A new analysis was performed, this time using the Benegrip variable in intersection with the others in the purchasing experience.

Table 5
Shopping experience - Benegrip

Variable	Yes	No
P2- Have you ever purchased a branded product?	91.5%	8.5%
P3 - Have you already bought another branded product?	61.0%	39.0%
P4 - Do you currently use/own any branded product?	54.3%	45.7%

Table 5 shows the same information, using the variable Benegrip, which represented the most remembered drug, and the results were similar. With the use of the product, it was easier to remember the brand. Table 6 presents the results of the items related to the perceived quality construct. With a mode of 4, which represents agree and the level of agreement (NC) of 80%, i.e., these respondents somehow agreed with the proposed assertions.

Table 6
Perceived quality construct

Item	1	2	3	4	5	Me	NC
P5.1	6	6	28	100	69	4.0	80%
P5.2	3	12	33	103	58	3.9	77%

P5.3	3	10	20	113	63	4.0	84%
P5.4	3	8	23	114	61	4.0	83%
P5.5	3	7	18	117	64	4.1	86%
P5.6	11	25	21	65	87	3.9	72%

Observing the results, the perceived quality resulted in expressive values, as well as the shopping experience, in this sense, when the consumer had the opportunity to try the product, he/she received additional information, which was even more integrated with his/her perception of quality (Biedenbach & Marell, 2010). To verify the existence of a relationship between the two variables, the PLS-SEM was used, using structural equations.

4.1 Confirmatory factor analysis

Figure 2 demonstrates the model with a second-order latent variable (repeating indicators). For a better fit of the model, the variable P5.6 was excluded from the perceived quality construct for presenting a factor loading below 0.50 (Hair at al, 2009).

For the formation of the VL "Experience with the brand", the categorical variables (dummy) P2, P3 and P4 were used, which form the reflexive construct. In this sense, the variables P2, P3 and P4 became manifest variables of the experience with the construct brand.

Table 7 demonstrates the reliability and validity of the first order constructs (VL). The Average Variance Extracted (AVE) values were greater than 0.5 and composite reliability could meet the minimum required of 0.70. The values of the diagonals were higher than the other values of the constructs, in this case the discriminant validity of the model was confirmed (Hair et al., 2009).

Table 7
Reliability and validity of the construct

VL de 1ª Ordem	P2	P3	P4	Qual_perc
P2 - Experience	1.00			
P3 – Experience	0.78	1.00		
P4 – Experience	0.70	0.34	1.00	
Perceived quality	0.35	0.27	0.12	0.89
Composite reliability	1.00	1.00	1.00	0.955
Average variance extracted (AVE)	1.00	1.00	1.00	0.809

Note: values on the diagonal are related to the square root of the AVEs; all correlations are significant at 5%.

Regarding Table 8, which demonstrates the reliability and validity of the latent variable of the structural model, considering that the composite reliability > 0.07 and AVEs > 0.50, in addition, the values in diagonals could surpass the other values of the construct, indeed it was confirmed the discriminant validity of the structural model (Hair et al., 2009).

Table 8
Reliability and validity of the construct

VL of the structural model	1	2
Brand experience	0.718	
Perceived quality	0.351	0.885
Composite reliability	0.760	0.955
Average variance extracted (AVE)	0.515	0.809

Note: values on the diagonal are related to the square root of the AVEs; all correlations are significant at 5%; the brand experience is a second order VL

Table 9 presents the results of the predictive validity indicators (Q^2), which must be different from zero, and the R^2, which indicates the quality of the adjusted model. For the area of Social and Behavioral Sciences, Cohen (1988) suggested that the model R2=2% could be classified as a small effect, R2=13% as a medium effect and R2=26% as a large one. As shown in Table 9, the perceived quality construct had a medium effect and the other effects are large.

Table 9
Predictive values

Variable	R^2	Adjusted R^2	Q^2
P2 - Experience	0.445	0.436	0.405
P3 – Experience	0.608	0.611	0.581
P4 – Experience	0.491	0.492	0.460
Perceived quality	0.124	0.126	0.095

Finally, Table 10 shows the general fit of the model, in this case, the hypothesis was confirmed ($\beta = 0.351$, $p < 0.001$). The result was similar to the work of Eslami (2020), which showed significance in the relationship between experience with the brand and perceived quality ($\beta = 0.665$, p

< 0.001) and with the research by Moreira et al. (2017), through which they validated the hypothesis of the influence of experience with the brand and perceived quality (β = 0.445, $p < 0.001$). The result could also converge with what was presented by Pina and Dias (2020), who validated the positive relationship of the dimensions of the experience with the brand with the perceived quality. Likewise, the research conducted by Biedenbach and Marell (2010) resulted in the small direct effect of customer experience on perceived quality (β= 0.16, $p < 0.10$).

Table 10

Structural coefficients - general model

Hypothesis	Coefficient	*p*-value	f²	Supported
H1	0.351	0.000	0.141	YES

Brand experiences lead to the creation of emotional bonds between the brand and the consumer, which increases brand trust and, consequently, the brand's perceived quality (Pina & Dias, 2020).

4.3 Moderating role of gender

Biological sex was considered a more appropriate and practical segmentation variable (Palan, 2001). Therefore, this study considered the moderating role of gender as biological sex (male versus female) in the relationship that brand experience influences perceived quality.

This study employed multigroup causal analysis, in structural equations, to examine the moderating effect of gender. The present study divided the entire sample into two distinct groups (female 95; male 114) and adopted the process used by Khan and Rahman (2017). It was found that the experience with the brand and its relationship with perceived quality was significant for women and not significant for men.

Table 11

Structural coefficients - Gender

Hypothesis	Female		Male	
	Coeffi-cient	*p*-value	Coeffi-cient	*p*-value
H1	0.406	0.000	0.206	0.072

As shown, the experience with the brand was directly and positively related to the perceived quality, proving the initial hypothesis of the work.

The relationship indicated that the quality of the consumer's relationship with the brand could be referred to the degree to which the consumer could perceive that their relationship with the brand met their expectations (Oliveira et al., 2017).

Women were more interested in quality and use more information to assess quality than men (Gitimu et al., 2013). Perhaps, men were not as picky about quality or rely on the brand name as an indication of the level of quality they have experienced in the past (Lee & Workman, 2021).

The results could converge with the evolution of marketing research evidenced by Berry et al. (2002) and other scholars such as Haeckel, Carbone and Berry (2003), Morrison and Crane (2007), who could bring the customer experience as a key issue for brand development. In addition to showing that the brand experience, this set of sensations, feelings and behavioral responses were evoked by different stimuli that occur when the customer directly enters or indirectly interacts with a certain brand.

Furthermore, the profile of respondents, the use of medication as a reference for the client and the use of gender as a moderator fills the gaps found in the literature.

One of the limitations of the study was associated with the non-probabilistic collection model, which allowed for a concentration of high income and education among respondents. Furthermore, the model that presents the marks in the questionnaire could influence the participants' responses.

5 Conclusion

The article explored the brand as a reference when making a purchase decision, as well as the importance of the customer experience, which is related to the perceived quality of this brand.

Regarding the perceived quality construct, the questions had an average of 80.9% of respondents confirming that the brands indicated present good quality.

The positive relationship between experience with the brand and its perceived quality was confirmed, with a coefficient of 0.351, *p*-value < 0.05, and with a predictive value ($f^2 = 0.14$) close to the average, with females having a coefficient

higher than the male, which did not result in significant, leading to believe that women are more linked to the perception of the quality of brands than men. In this sense, the research question was answered considering that the greater the customer experience with the brand, the greater the recognition of its quality.

6 Contributions

It is expected to contribute to the academy with a model that associates experience with the quality of the brand, suggesting that this model may be replicated in other regions, with other products or services with the purpose of confirming and improving the model.

Regarding moderation by gender, it was found that women were more identified than men, demonstrating the need for marketing work aimed at the male audience, aiming to bring the product they use closer to the brand they most remember.

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RN Revista de Negócios
Studies on emerging countries

Intercooperative Relationships: characteristics, challenges and possibilities for Interorganizational Cost Management

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KEYWORDS

Intercooperation, IOCM, Contingency Theory

Received 01.04.2021
Reviewed 22.05.2021
Accepted 31.05.2021

ISSN 1980-4431
Double blind review

ABSTRACT

This study aims at discussing the characteristics of intercooperative relationships and the challenges and possibilities for Interorganizational Cost Management (IOCM) in these arrangements. For this, the theoretical essay method was used to review the national and international literature in the area of cooperatives. Thus, based on the literature and having the Contingency Theory (CT) as a theoretical lens, a contingency structure of the IOCM was proposed, consisting of eleven factors grouped into "factors exogenous to the cooperative", "factors specific to the cooperative" and "factors specific to the intercooperative relationship". The results of the analysis show that: (i) factors external to the cooperatives can make the adoption of the IOCM viable, such as pressure for financial competitiveness and multiple objectives; (ii) specific factors of cooperatives, such as small size trends and shortage of capital, are challenges to IOCM; and (iii) factors specific to intercooperative relationships, such as lack of trust and competition, can restrict the adoption of IOCM techniques and the very formation of intercooperative relationships. It is noteworthy that while CT conventionally works with the perspective of a single company, this essay highlights possibilities of its application in interorganizational relationships, considering relationship factors beyond those specific to the company. Furthermore, on the theme of IOCM, no studies applied to intercooperative relationships were identified. It is concluded that the research can bring new perspectives to researchers, especially on the topic of management in cooperative societies, with reflections both on the adoption of IOCM techniques, as well as on the constitution and performance of intercooperative relationships.

PALAVRAS-CHAVE

Intercooperação, GCI, Teoria de Contingência

RESUMO

Este estudo visa discutir as características dos relacionamentos intercooperativos e os desafios e possibilidades para a Gestão de Custos Interorganizacionais (GCI) nesses arranjos. Para isso, recorreu-se ao método de ensaio teórico para revisar a literatura nacional e internacional na área de cooperativas. Assim, alicerçado na literatura e tendo a Teoria de Contingência (TC) como lente teórica, propôs-se uma estrutura contingencial da GCI composta por onze fatores agrupados em "fatores exógenos à cooperativa", "fatores específicos da cooperativa" e "fatores específicos do relacionamento intercooperativo". Os resultados da análise evidenciam que: (i) fatores externos às cooperativas podem viabilizar a adoção da GCI, como pressões por competitividade financeira e objetivos múltiplos; (ii) fatores específicos das cooperativas como tendência de pequeno porte e escassez de capital, são desafios à GCI; e (iii) fatores específicos dos relacionamentos intercooperativos, como falta de confiança e competição, podem restringir a adoção de técnicas de GCI e a própria formação de relações de intercooperação. Destaca-se que enquanto a TC convencionalmente trabalha com a perspectiva de uma única empresa, este ensaio evidencia possibilidades de sua aplicação em relações interorganizacionais, considerando fatores do relacionamento além dos específicos da empresa. Além disso, na temática da GCI não foram identificados estudos aplicados às relações intercooperativas. Conclui-se que a pesquisa pode trazer novas perspectivas aos pesquisadores, especialmente no tema de gestão em sociedades cooperativas, com reflexões tanto sobre a adoção das técnicas da GCI, quanto para constituição e desempenho de relações intercooperativas.

1 Introduction

The increasingly uncertain and dynamic global market has encouraged companies to seek strategies that help them to be more competitive (Fehr & Rocha, 2018), such as acting in key markets, increasing productivity and product quality, reducing costs or investing in qualification of employees and new technologies. However, these are very costly activities and most organizations face difficulties in obtaining the necessary resources for this (Klotzle, 2002).

Therefore, strategic moves such as the formation of networks, joint ventures, clusters, among other forms of alliances, started to occur between companies from different regions and sectors, including those involving direct competitors (Braga, 2015; Konzen & Oliveira, 2015), aiming at obtaining benefits such as gains in scale and market power, in addition to reducing costs and risks (Corso & Fossa, 2008).

This reality is also imposed on cooperatives and the formation of interorganizational relationships is presented as a strategy to maximize wealth, strength and acquire mutual benefits. Intercooperation, as the interorganizational relationships that occur between cooperatives are called, is encouraged in the 6th International Principle of Cooperatives as a way to serve members more effectively and strengthen the cooperative movement (International Co-operative Alliance [ICA], 2015).

However, in an interorganizational relationship, the success of individual companies depends on joint performance and this often falls short of expectations due to problems of coordination and alignment in actions (Dhaifallah, Md-Auzair, Maelah, & Ismail, 2016). In this line of argument, ICA (2015) points out that intercooperation relationships, to be effective, need to balance different interests and this requires time, resources and skills to solve problems, in addition to transparent, responsible and democratic decision-making processes.

Faced with the challenges, research shows that many cooperatives end up acting in isolation and competing with each other several times (Konzen & Oliveira, 2015; Fonte & Cucco, 2017). For Mendina, Menezes Lima, Souza and Milan (2019), this resistance of cooperatives to establish intercooperative relationships is related to aspects that can harm their performance, such as cultural differences, fear of losing autonomy and power, lack of trust, competition and opportunistic behavior.

In this situation, Interorganizational Cost Management (IOCM) can be an interesting alternative to manage coordination problems, reduce information asymmetries and costs that cross organizational boundaries (Cooper & Slamulder, 2004; Kajuter & Kulmala, 2005). IOCM is already recognized as a set of practices aimed at aligning objectives, increasing competitiveness and efficiency in interorganizational relationships. However, as it is highly influenced by its application context (Kajuter & Kulmala, 2005, Windolph & Möller, 2012), it is relevant to understand the relational factors that can impact it to build combinations that lead to superior performance.

Given the above, the question is: which factors can favor or inhibit the application of Interorganizational Cost Management in the context of intercooperative relationships? From the literature analysis under a contingency perspective, this theoretical essay aims to discuss the characteristics of intercooperative relationships and the challenges and possibilities for Interorganizational Cost Management in these arrangements.

For this purpose, the Contingency Theory (CT) approach was adopted as a theoretical lens to understand the conditions under which IOCM would be facilitated or restricted in intercooperation relations. CT is often used to explain the conditions under which specific Management Control Systems (MCS) will be found in organizations (Chenhal, 2006, Pernot & Roodhooft, 2014, Otley, 2016).

As the conventional contingency structure works with the perspective of a single company, considering internal and external factors, in the area of IOCM studies such as those by Kajuter and Kulmala (2005), Camacho (2010), Windolph and Möller (2012) and Caglio (2018) included the understanding of contextual factors of the interorganizational relationship in addition to those specific to the company. In this aspect, the present research adds to the aforementioned studies, theoretically justifying itself by showing possibilities of applying CT in the context of interorganizational relationships, especially in the relationships between cooperatives.

It is noteworthy that in an increasingly competitive business environment, research on interorganizational relationships is growing in the number of national and international publications, but studies aimed at relationships among cooperatives are still incipient (Lago & Silva, 2012). As for the IOCM theme, specifically, this is still recent, but it also has researches concentrated in the field of investor owned firms (IOF), where its conceptual basis was elaborated (Duarte, 2017), and no studies in the context of intercooperation have yet been identified. Therefore, it is expected that the research can bring new perspectives to researchers and contribute to the advancement of knowledge on the themes of IOCM and cooperative societies.

Additionally, the results of this study can contribute in a practical way to the activities of managers of cooperatives by raising reflections on potential restrictions and facilitating aspects both for the adoption of IOCM techniques, as well as for the constitution and performance of intercooperative relationships.

The article is structured and contains, in addition to this introduction, a second section aimed at presenting the concept of IOCM and the relational contexts associated with its practices. The third section describes the research methodology. The fourth and fifth sections, respectively, characterize the intercooperative relationships and discuss their particularities in the light of CT as challenges or favorable possibilities for the adoption of IOCM in these arrangements. Finally, the sixth section presents the final considerations.

2 Interorganizational Cost Management and the Contingency Theory

The term "Interorganizational Cost Management" emerged timidly in the 1990s as a result of research led by Robin Cooper in the management area of Japanese companies (Farias & Gasparetto, 2015). In the first study that specifically addresses IOCM, Cooper and Yoshikawa (1994) state that the technique improves coordination and efficiency between companies in a chain, guiding cost reduction.

From this, Cooper and Slagmulder (1999) specify the objectives of IOCM, such as cost reduction, increased profitability and the sharing of additional gains, in addition to the creation and maintenance of cooperative actions among members of a network. Thus, it is understood that IOCM comprises a set of managerial and operational practices used in the context of interorganizational relationships (Uddin, 2013) in order to improve coordination between companies (Agndal & Nilsson, 2009; Kajuter & Kulmala, 2005), reduce information asymmetries (Cooper & Slamulder, 2004) and manage costs that cross organizational boundaries (Cooper & Slamulder, 2004; Kajuter & Kulmala, 2005).

As for its operationalization, IOCM is often addressed in the literature as a concept composed of a set of practices or techniques, as shown in Table 1.

Table 1: IOCM techniques cited in the literature

Technique	Description	Author (year)
Target costing	Tool that aims at ensuring that products or services meet the price that customers are willing to pay and the financial return expected by the owners of the capital. Target Cost = Target Price – Profit	Agndal and Nilsson (2009); Cooper and Slagmulder (2004); Cooper and Yoshikawa (1994); Fayard, Lee, Leitch and Kettinger (2012); Möller, Windolph and Isbruch (2011); Windolph and Möller (2012)
Functionality-price-quality trade-off	It proposes to reduce product functionality and/or relax its quality specifications in order to reduce costs. As it deals with three variables that can be traded, it has a good chance of bringing positive results to all parties involved.	Agndal and Nilsson (2009); Cooper and Slagmulder (2004); Cooper and Yoshikawa (1994); Möller, Windolph and Isbruch (2011); Windolph and Möller (2012)
Interorganizational cost investigation	It implies intense interactions among companies to increase the scope of project changes, and may involve more than two members of the network. The essential design of the final product remains fixed.	Agndal and Nilsson (2009); Cooper and Slagmulder (2004); Möller, Windolph and Isbruch (2011); Windolph and Möller (2012)

Concurrent cost management	Promotes substantial changes in product design, so buyer and supplier designs must be modified accordingly. Technique used for high value items.	Agndal and Nilsson (2009); Cooper and Slagmulder (2004); Möller, Windolph and Isbruch (2011); Windolph and Möller (2012)
Kaizen costing	Improvement system aimed at cost reduction in the production phase. The product design is considered fixed and ways are sought to coordinate activities in the chain so that production is constant and allows optimizing manufacturing and delivery costs.	Agndal and Nilsson (2009) ; Fayard et al. (2012)
Open-book accounting (OBA)	Sharing internal accounting data, especially the cost structure, in order to facilitate cooperation between buyer and supplier to identify critical areas and potential for cost reduction.	Agndal and Nilsson (2009) ; Fayard et al. (2012); Kajüter and Kulmala (2005); Möller, Windolph and Isbruch (2011); Windolph and Möller (2012)

Source: Elaborated by the authors (2021)

Considering that the practices that make up the IOCM are diverse, Cooper and Slagmulder (2004) concluded that the selection of the most appropriate technique occurs depending on the configurations of the existing relational context and the relational context itself changes as companies develop their capacity. to carry them out.

Therefore, the perceived effect on interorganizational performance varies according to the IOCM technique adopted and the specific type of relational context associated to it, thus highlighting the importance of identifying existing environmental factors (Cooper & Slamulder, 2004).

Goven the above, several researchers have explored the IOCM and the variables that inhibit or favor the implementation of its practices, such as Cooper and Slagmulder (2004), Kajüter and Kulmala (2005), Souza (2008), Agndal and Nilsson (2009), Camacho (2010), Möller, Windolph and Isbruch (2011), Windolph and Möller (2012), Faria, Soares, Rocha and Rossi (2013), Campos, Oliveira, Leal and Duarte (2016), Duarte (2017), Caglio (2018) and Dhaifallah, Md-Auzair, Maelah and Ismail (2019), among others.

Souza (2008), based on research by Cooper and Slagmulder, proposes that the scenario that makes the application of IOCM possible would be composed of: (i) products with a profit margin below the target and multiple features; (ii) components with low levels of technological restriction and low value index; (iii) relationships that involve interdependence and trust among companies and the creation of an environment with stability, cooperation and mutual benefits; (iv) types of chain with dominant companies that manage to coordinate and direct the process; and (v) presence of disciplining, enabling and encouraging mechanisms that, respectively, can define the parameters of the IOCM, guide those involved and distribute the benefits fairly.

In addition to these, when discussing the specific practice of OBA, Kajüter and Kulmala (2005) concluded that the factors that induce it are: (i) competitive environment with pressure to reduce costs; (ii) general economic growth trend; (iii) the company is large; (iv) there is an accurate cost accounting system; (v) competitive policy of the network of companies with the external environment and cooperative policy among network members; (vi) commitment of companies to maintain long-term relationships; (vii) mature hierarchical relationships in the chain of companies; (viii) products that are functional and manufactured; (ix) infrastructure with resources and tools for interorganizational support; and (x) social relationship among companies based on mutual trust.

Camacho (2010) used CT to analyze the conditioning factors of IOCM in the value chain of private hospitals in Brazil and identified a set of 12 factors, four of which (type of chain, trust, mutual benefits and degree of competition) considered inhibitors IOCM practices and eight factors (product profit margin, product functionality level, mechanisms/infrastructure, stability, cooperation, economic dependence, management information system and commitment) that favor its implementation.

The research by Windolph and Möller (2012) used the Transaction Cost Theory together with CT to investigate the relationship among OBA, IOCM and supplier relationship satisfaction. The contextual factors evaluated were “relational social norms”, which aim at protecting against

opportunistic behavior after the disclosure of information, in addition to "buyer's opportunistic behavior". As for the performance of the buyer-supplier partnership, this was evaluated based on the satisfaction of the relationship with the supplier. The results indicated that OBA can negatively affect the satisfaction of the relationship with the supplier and represent a potential risk for cooperation, especially if done unilaterally. Additionally, relational social norms mitigate the negative effect of unilateral OBA on supplier satisfaction.

In a recent study, Caglio (2018) sought to analyze when and why OBA is used and its relationship with organizational performance. Based on the literature, the author raised key antecedents for the use of the OBA and investigated how these influenced the extent of the use of the OBA based on the responses of 135 European managers. The contingency structure considered: (i) environmental factors, with competition based on costs and economic trends; (ii) relational factors, being a willingness to collaborate and long-term orientation; and (iii) technical and procedural factors, being a cost accounting system and shared infrastructure. The extent of use of the OBA was evaluated through a list of different managerial accounting information potentially exchanged between companies and performance by perceived financial gains and non-financial performance. The results indicate that the extent of OBA use was explained by relational factors (such as the propensity to work together in the long term) and technical factors (such as the presence of sophisticated cost accounting systems), as well as suggesting a positive association between OBA and company performance.

Given the above, it is clear that CT is used with the intention of explaining how MCS vary according to specific situations and whether they are associated to better performance (Chenhal, 2006; Otley, 2016). The basic contingency model deals with the strategy-structure-performance paradigm, as shown in Figure 1.

Figure 1: Basic Contingency Structure

Source: Anderson and Lanen (1999, p. 380)

It can be seen in Figure 1 that exogenous environmental factors and company-specific endogenous factors influence the organizational structure, understood as management accounting practices (Anderson & Lanen, 1999). The performance variable is linked to the contingency structure, indicating that the fit between the contingencies and the organizational structure will affect performance (Donaldson, 1999).

As research progressed, several variables were added to explain the design and use of MCS. Part of this is due to the process of changes in the world economy that impacted the restructuring of many companies, with greater outsourcing of activities and integration in the supply chain, which ended up being reflected in the context of accounting and management control (Otley, 2016).

For Pereira (2014), interorganizational relationships have challenged management accounting, hence the growing interest of researchers in investigating interorganizational management controls. Thus, CT started to be frequently used to deal with situational variables that influence the design of interorganizational relationships in the MCS, as is the case of research focused on the IOCM (Pernot and Roodhooft, 2014).

Therefore, this essay reflects on the characteristics of intercooperative relationships analyzed as contingent factors for the adoption of IOCM practices.

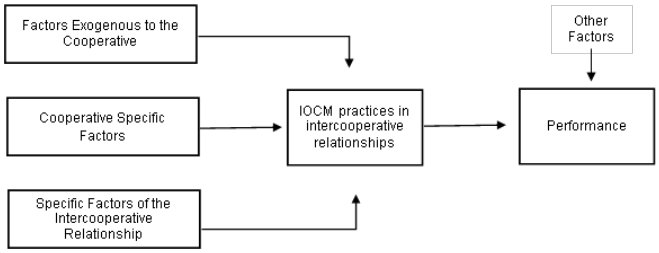
3 Methodology

In the present study, the theoretical essay method was used, through which, based on the literature, a logical and reflective exposition was sought, with rigorous argumentation, interpretation

and personal judgment to defend a certain position (Severino, 2007).

Contingency Theory (CT) was adopted as a theoretical lens to understand the conditions under which IOCM would be facilitated or restricted in intercooperative relationships. Thus, as shown in Figure 2, it was sought to build a contingency structure based on the literature, which would allow discussing the relational factors of intercooperation as conditions for the adoption of IOCM practices in these relationships.

Figure 2: Contingency Structure for IOCM in Intercooperative Relationships



Source: Based on Kajüter and Kulmala (2005)

To achieve the proposed objective, supported by the seminal studies by Cooper and Slamulder (2004), Kajuter and Kulmala (2005) and Souza (2008), the contingent factors of the IOCM evaluated in this research were initially delimited, grouped in Table 2 in: (i) two factors exogenous to the cooperative; (ii) two specific factors of the cooperative; and (iii) seven specific factors of the interorganizational relationship.

Table 2: Contingency factors analyzed in the research

IOCM Contingent Factors		**Scenario in which factors enable the application of IOCM**
Factors exogenous to the cooperative	Competition level	Highly competitive market causes pressure to continually reduce costs, influencing IOCM.
	Economic trend	An economy with a general growth trend favors and influences the extension of the IOCM.
Cooperative-specific factors	Firm size	The implementation and use of IOCM is more favorable in large companies.
	Cost Accounting System	Existence of a system capable of providing accurate cost and margin information at the product level.
Specific factors of the interorganizational relationship	String Types	The IOCM needs to be supported by at least one of the members, hierarchical networks please it.
	Mechanisms	Interorganizational infrastructure with disciplinary, enabling and encouraging mechanisms enables the necessary support for the IOCM.
	Interdependence	The greater the mutual dependence between organizations, the more favorable the application of the IOCM.
	Mutual trust	Success of IOCM depends on a high level of mutual trust among companies, allowing them to predict each other's behavior.
	Stability	The commitment among partner companies makes for a stable, long-lasting, secure and constant relationship, helping to achieve long-term goals of IOCM.
	Cooperation	Parties focused on achieving common goals, such as effective cost management and problem solving.
	Mutual Benefits	Sharing the gains achieved by the companies that participate in the partnership encourages the continuity of IOCM.

Source: Elaborated by the authors (2021)

It is noteworthy that, of the contingent factors of the IOCM proposed by Cooper and Slamulder (2004), Kajuter and Kulmala (2005) and Souza (2008), the characteristics of the products and their components were not analyzed in this research, as it is understood that they are specifics of the area of operation of each cooperative and that are not related to the fact that it is or is not involved in an intercooperation relationship.

In the next section, based on a review of the national and international literature in the area of cooperatives, it was sought to contextualize the characteristics of intercooperative relationships and synthesize, for each contingent factor listed in Table 2, which characteristics can be considered as inhibitors or challenges for the adoption of IOCM practices and which lead to favorable possibilities of their adoption in these arrangements.

4 Characterization of Intercooperative Relationships

A cooperative is an autonomous association of people voluntarily united to meet economic, social and cultural needs through a democratically managed and jointly owned company (ICA, 2015).

Based on this, the particular characteristics of these organizations are both sources of criticism by those who consider cooperativism inefficient, as they are considered competitive advantages of cooperatives over conventional companies. Thus, in Table 3, some issues related to the constitution and management of cooperatives identified in the traditional literature as critical for their viability in the globalized economy are highlighted (Bretos & Marcuello, 2017).

Table 3: Difficulties and strengths of cooperatives

Aspect	Dificulties	Strengths
Eonomic and financial structure	Underinvestment, risk aversion, lack of external financing and productive inefficiency.	Participation of workers in decision-making, ownership and profits, cooperation with other cooperatives and organizations.
Size	Small size, weak market position, slow growth.	Cooperation with other cooperatives and organizations, education aimed at sustainable growth.
Management	Recruitment and retention of managers, lack of management expertise in cooperative values and culture.	Management training and promotion policies, retention by means other than monetary incentives, training for managers in values and cooperative culture.
Democratic decision making	Slow and inefficient collective decision-making process in view of the members' heterogeneous goals.	Horizontal organizational structures, decentralization of decision power, training in democratic decision making.

Source: Based on Bretos and Marcuello (2017)

From the above, it is clear that intercooperation is identified as one of the outstanding strengths of cooperativism. This partnership among cooperatives can range from knowledge sharing to common commercial operations (Braga, 2010) and symbolizes a second step for the organization of cooperative members that allows them to access new markets, develop products or services, obtain gains in scale and reduce costs, professional qualification, among other advantages (Konzen & Oliveira, 2015).

To better understand the structures of intercooperation, it is important to clarify that, in general, the cooperative movement is vertically organized into three levels: (i) local, which includes singular or first-degree cooperatives; (ii) regional, which are the so-called federations, central or second-degree cooperatives, formed by the union of unique sectorial cooperatives; and (iii) national, third degree or confederations, which reflect the union of central cooperatives of any branch (Organization of Brazilian Cooperatives [OBC], 2020).

For Fonte and Cucco (2017), this form of organization shows a clear proposal of vertical ties and fragile horizontal links in the governance structure of the cooperative movement. In contrast, ICA (2015) states that, in addition to local, national and international structures that facilitate intercooperation, there is also the possibility of this occurring through informal project-based collaborations among cooperatives aiming at building trust and solidarity, or even via creation of networks that, normally with a less rigid structure, involve people and allow the emergence of new cooperatives.

As for the reasons or antecedents that lead to the formation of intercooperative relationships and the factors need to be associated to the intercooperation to achieve the desired results, Lago (2009) identified as being: (i) the asymmetry, both of information and power, economic asymmetry and market, as it shows the potential that an organization has to exercise power or control over another organization or resources; (ii) reciprocity, which consists of mutual help among cooperatives in times of difficulties or in the development of joint projects; (iii) efficiency, that is, the search for greater productivity of available resources that can occur through obtaining and improving technical and market information, reducing costs, guaranteeing the product's marketing channel or meeting the necessary conditions to meet market requirements; (iv) stability or search for adaptation in the face of uncertainty; and (v) legitimacy, focused on the recognition and justification of cooperativism before society and its members.

According to Souza (2016), relations among cooperatives are difficult to manage and involve many factors to be lasting and generate benefits. When evaluating a netchain of milk in the State of

Minas Gerais, the author found that the cooperatives considered themselves stronger separate than involved with intercooperation and the relationship of the central cooperative with the singular ones was one of competition and opportunism, involving only commercial interest. In this case, the lack of trust among the cooperatives and the focus on their own goals made it difficult to share information and the search for joint growth.

This view was supported by Martins, Faria, Prearo and Arruda (2017) in a survey of 146 individual credit unions in Brazil, which demonstrated that trust, commitment and cooperation positively influence the relationship of individual credit unions with their central.

Misguided partnerships and competition among cooperatives were the main restrictive factors for intercooperation identified in a network of agro-food cooperatives in the milk industry in the State of Paraná. Despite this, drivers such as formal governance mechanisms, corporate co-participation of cooperatives among themselves, independent business units and professionalized management, made this a successful case of intercooperation among three unique cooperatives and a foundation (Mendina et al., 2019).

For Hannachi, Coleno and Assens (2020), the competition factor also appeared and was overcome in the formation of horizontal relationships among cooperatives in France. The articulation of cooperative and competitive strategies made cooperatives capable of coordinating farmers' production practices and choices, market needs and organization in agricultural regions, in order to manage the presence or absence of crops with Genetically Modified Organisms (GMO) and avoid its mixing with conventional cultures. In this case, the importance of cooperative managers being aware of possible "coopetition" strategies and the various mechanisms (formal and informal) of governance to establish coordination, communication and trust among rival cooperatives was highlighted.

The case study carried out by Galerani (2003) addresses an intercooperative relationship in the dairy sector that emerged from a singular cooperative, with serious financial difficulties, and a central cooperative that faced shortages of raw materials. Intercooperation aimed at the immediate survival and subsequent long-term strengthening of cooperatives. In general terms, the results obtained were positive with the optimization of the structure, achievement of production scale, cost reduction and an end to competition between cooperatives. As a disadvantage of intercooperation, in this case, the dependence of the singular cooperative in relation to the central cooperative regarding to the definition of the price to be paid to the producer for the raw material, in addition to the fact that the cooperative members are more distant from the management, was pointed out. This aspect deserves attention, since independence is included in the basic principles of cooperativism and cannot be violated (ICA, 2015).

In the agri-food sector in Italy, Fonte and Cucco (2017) realized that the cooperative movement is marked by conflicting views regarding the scale of cooperatives, the distance (spatial and cultural) between managers and cooperative members, and the emphasis on competitiveness. For the authors, there is a structural dualism between small and large cooperatives, in which the large ones have market behavior, organizational culture and management styles, while the small ones are focused on the social benefits of cooperation and the democratic participation of cooperative members and the local community. In this case, attempts at collaborations in a heterogeneous environment, with multiple stakeholders and without shared values can intensify conflicts between cooperatives.

In view of this, this characterization is concluded by pointing out that when speaking of intercooperation, it is necessary to consider not only the vertical or horizontal interorganizational relationships between cooperatives, but also the interpersonal relationships. This fact adds complexity to cooperative management in isolation and even more when it comes to the formation and performance of intercooperative relationships (Pérez, Cervantes, & Martínez, 2016).

Therefore, given the multiplicity of actors and objectives involved in intercooperation, the IOCM can be an interesting alternative for the coordination, management and performance of relationships. However, as the specificities of the intercooperation context can impact the efficiency of the IOCM, in the next section, these are carefully analyzed as conditioning factors of the technique.

5 Challenges and Possibilities of IOCM in Intercooperative Relationships

As defined in the research methodology, based on the characteristics of the previously highlighted intercooperative relationships, an argumentative synthesis effort was made around 11 contingent factors for IOCM, namely: (i) two factors exogenous to the cooperative (level of competition and trend economic); (ii) two specific factors of the cooperative (firm size and cost accounting system); and (iii) seven specific factors of the interorganizational relationship (type of chain, interdependence, mechanisms, cooperation, trust, stability and mutual benefits).

The level of competition is the first exogenous factor considered by Kajüter and Kulmala (2005), in which it is stated that a highly competitive market causes pressure to continuously reduce costs, positively influencing IOCM. In the case of cooperatives, it is highlighted that these are companies with an economic function and at the same time a social group of cooperative members who can assume multiple roles, often in addition to owners, also suppliers, customers, workers and managers (Pérez, Cervantes & Martínez, 2016). Therefore, they are challenged to compete in an increasingly aggressive business environment, considering dual performance objectives: the search for organizational profitability and the guarantee of benefits to members (Franken & Cook, 2015, Benos, Kalogeras, Verhees, Sergaki & Pennings, 2016, Pérez, Cervantes, & Martínez, 2016, Grashuis & Su, 2019). Consequently, as cooperatives are subject to pressure from the globalized market, this is one of the factors considered as a favorable possibility for the adoption of the IOCM.

Regarding to the general economic trend, Kajüter and Kulmala (2005) understand that economic growth favors IOCM as partners benefit from additional business opportunities that arise through closer cooperation. At this point, evidence indicates that cooperatives present countercyclical action and better performance when compared to IOF in periods of crisis (Fonte & Cucco, 2017). This reflects a favorable scenario for IOCM, as cooperatives can take advantage of periods of economic growth and manage to be more resilient in times of economic downturn.

Regarding to the factors "firm size" and "cost accounting system" that are specific to the cooperative, the use of IOCM is considered more favorable in large companies, normally able to commit more resources in capable accounting systems to provide reliable information on costs and margins at the product level (Kajüter & Kulmala, 2005). These factors can be considered challenges for the adoption of IOCM practices in cooperatives, since considering that the growth of the organizational structure increases the heterogeneity in the attitudes and objectives of cooperative members, in the quest to maintain their democratic nature and proposals for the local community, most cooperatives tend to remain small and with financial capital restrictions (Bretos & Marcuello, 2017, Grashuis & Su, 2019).

Regarding to the specific factors of the interorganizational relationship, the first is the “type of chain”. In this, hierarchical networks are considered more favorable for IOCM, since, if a company exerts power or control over others, it may find it easier to support the adoption of the technique by others (Cooper & Slagmulder, 2004, Kajüter & Kulmala, 2005), not only for the coercive issue, but for exercising the function of coordination between companies (Martins et al., 2017).

In the context of cooperatives, different types of alliances can occur, but vertical integration formats are the most widespread internationally. In Brazil, for example, it is specified in Law n. 5.764 of December 16, 1971, called the law on cooperatives, the possibility of forming central cooperatives and confederations (Brazil, 1971). It is noteworthy that, although this characteristic leads to believe that this preponderant format of vertical intercooperation could give rise to hierarchical relationships between cooperatives, in fact this should not occur. According to ICA (2015), in any format of intercooperation, decision-making must be flexible, fair and representative of the different stakeholders, so that no one person or group can dominate the process.

Based on the above, it can be said that the type of chain expected to be found in intercooperative relationships will not necessarily be the hierarchical pattern. In this sense, it is understood that it will be the asymmetry of power among the cooperatives in each situation that will show whether the type of chain is a potential challenge or possibility for adopting the IOCM.

In line with this vision, the “interdependence” among organizations also contributes to the stability of the relationship, supporting the IOCM (Cooper & Slagmulder,

2004, Souza, 2008). For cooperatives, finding themselves in a situation of interdependence favors the formation of intercooperation, but requires care with the presence of enabling, disciplining and encouraging "mechanisms" in the interorganizational infrastructure (Cooper & Slagmulder, 2004, Souza, 2008). It is necessary to seek a balance between the indispensable management autonomy by the cooperative members and the adoption of mechanisms that reduce individual freedom and flexibility, but which allow to guide, control and inform the distribution of benefits generated by the relationship (Galerani, 2003, Mendina et al., 2019, Hannachi, Coleno, & Assens, 2020). Therefore, as independence is included in the basic principles of cooperativism and should not be violated (ICA, 2015), it is understood that interdependence factors and mechanisms are challenges for the adoption of IOCM in intercooperative relationships.

Additionally, the "cooperation" factor highlights the mutual help among organizations focused on achieving common goals, such as effective cost management (Cooper & Slagmulder, 2004, Kajüter & Kulmala, 2005). This factor can be considered a challenge for the IOCM in intercooperative relationships, because even the cooperation between cooperatives included in the international principles of the movement (ICA, 2015), the literature shows a focus on their own goals and competition, especially among larger and smaller cooperatives (Souza, 2016, Fonte & Cucco, 2017, Grashuis & Su, 2019).

"Trust" is one of the most sensitive contingency factors when it comes to IOCM, since, if the value chain is hierarchical, there may even be a forced implementation of the technique, but its success requires a level of mutual trust that allows companies to predict the behavior of each other (Cooper & Slagmulder, 2004, Kajüter & Kulmala, 2005). Since gaining trust takes time and effort, this is directly related to the "stability" factor. Stability shows the commitment between companies and makes the partnership lasting, secure and constant, allowing those involved to achieve long-term goals and enjoy the results of IOCM (Cooper & Slagmulder, 2004, Souza, 2008).

In cooperatives, trust and stability are identified as some of the factors that most impact the decision to carry out intercooperation or not (Martins et al., 2017, Mendina et al., 2019). Consequently, the presence or absence of these two factors in a context will be reflected in a favorable possibility for the adoption of the IOCM or in a challenge, both for the adoption of the practice and for the formation and continuity of the intercooperative relationship.

Finally, "mutual benefits" is the last specific factor of the interorganizational relationship and deals with the need to share the gains achieved by the companies that participate in the partnership, encouraging the continuity of the IOCM (Cooper & Slagmulder, 2004). In the scenario of intercooperation, it appears that the search for cost reduction, greater productivity of available resources and long-term strengthening are successful in many cases. Even so, it is known that the financial measures normally used to evaluate the performance of IOF may not be sufficient for intercooperation relationships or not be the best indicator of success. It is necessary to consider that the performance of cooperatives must also encompass aspects from other areas, such as the satisfaction of the members' objectives (Franken & Cook, 2015, Benos et al., 2016). Therefore, defining what would be the common gains and their sharing can also be considered a challenge for the IOCM in intercooperation.

6 Final considerations

In a scenario where cooperatives are challenged to remain competitive and at the same time faithful to cooperative principles, it is important to find ways to improve financial performance and also the quality of products and services offered to members. In these terms, intercooperative relationships and adoption of IOCM practices can bring several advantages, but also difficulties to be managed and achieve the expected performance.

Therefore, we sought to discuss the characteristics of intercooperative relationships and the challenges and possibilities for Interorganizational Cost Management in these arrangements. The results of this theoretical essay allow us to infer that, in light of CT, of the 11 contingency factors discussed in the context of intercooperation, only the two factors external to cooperatives present themselves as possibilities that visibly enable the adoption of IOCM.

It was found that, in the definition of cooperative itself, the multiple objectives that must be pursued are already evidenced, in this case,

meeting the economic, social and cultural needs of the cooperative members. So, it is understood that these organizations are especially pressured by the competitive environment in which they operate, both to be financially competitive and to meet the different needs of members.

However, although this organizational format, with greater involvement of capital owners in the decision-making process, brings greater complexity to management, it also implies greater commitment and resilience in times of crisis.

Thus, IOCM techniques that encourage interaction between those involved, such as the functionality-price-quality trade-off, interorganizational cost investigation and concurrent cost management, can be well accepted and align with the democratic management process advocated by cooperatives. Therefore, its adoption can bring new possibilities for defining and managing common goals between cooperatives and members from different locations and, consequently, for improving the financial results of intercooperation.

As for the two specific factors of the company, it was highlighted that most cooperatives tend to remain small and with a shortage of financial capital, presenting less chances of having systems capable of providing accurate information for the implementation of the IOCM. However, it is worth analyzing which intercooperation actions are identified in the literature as one of the main solutions adopted to face other difficulties (such as a weak position in the markets, slow growth and productive inefficiency) that are associated to restrictions on the size and economic-financial structure of singular cooperatives.

Thus, "size" and "cost accounting system" are treated as challenges to the adoption of IOCM in cooperatives as factors specific to these isolated organizations, but which, given the establishment of intercooperation actions, will probably change and not necessarily will restrict the IOCM.

In the analysis of specific factors of intercooperative relationships, some aspects of cooperatives that challenge the adoption of IOCM techniques and the very formation of intercooperative relationships were revealed, such as lack of trust, focus on their own goals and competition among themselves, in addition to the need to seek a balance between the principle of independence of organizations and the adoption of mechanisms that allow guiding the relationship, defining mutual objectives and controlling the distribution of benefits achieved.

This essay allowed us to understand that intercooperation strategies can bring several benefits to cooperatives, but they are often not adopted because they are associated to increased interdependence and management complexity between organizations, highlighting the need for a flow of information that crosses borders organizational.

Therefore, it is concluded that the reflection on the challenges and possibilities for adopting the IOCM can contribute both to the performance of intercooperative relationships and to its constitution process, adding new perspectives for the alignment and coordination of interorganizational actions in this context.

Finally, it is suggested that future research seeks to empirically analyze the problem proposed here, especially the relationship among contingency factors, the design of the IOCM and the performance of intercooperative relationships.

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