



Coop innovation framework: An artifact for innovation in Brazilian cooperatives

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STRUCTURE ABSTRACT

Purpose: The objective of this paper is to propose a framework on innovation management specific to cooperatives.

Theoretical framework: The Coop Innovation Framework was built, a synergistic system based on the culture of cooperation and cooperativism.

Design/methodology/approach: This paper used Design Science Research in a Brazilian cooperative to develop a framework.

Findings: Some points of the framework of commercial companies were removed and others specific to cooperatives introduced.

Research, practical & social implications:

1. **Theoretical implications:** Begins the study of innovation in cooperatives, considering cooperativism as a theoretical basis, to consider the peculiarities of cooperatives in their form and organizational objective.
2. **Practical Implications:** The paper aims to provide the cooperative manager with a method of managing innovation in cooperatives, freeing them from using methods of market companies.
3. **Social Implications:** It can contribute to the perennity of the cooperative and thus contribute to the development of the region.

Originality/value: It contributes to the development of innovation management studies specifically in cooperatives.

1. Introduction

Cooperatives are peculiar organizations due to them having different objectives and methods from commercial companies. It is common in Brazil for cooperatives to forget their identity and behave as traditional commercial companies, focused only on maximum profit. However, cooperatives share and compete for spaces with commercial companies. Cooperatives seek to remain attractive to their members and, therefore, strive to develop management techniques.

The cooperatives that effectively work on their cooperative identity,

understand that they have as their central objective the development of their cooperative members. Therefore, they understand that they are an organization of people, and that capital is at the service of the development of the members (Schneider, 2019). Being aligned with the cooperative identity makes the cooperatives seek management techniques appropriate to this objective, that is, the development of the members (Novkovic, 2016). The same is true in innovation management (IM) in cooperatives.

The focus of IM in commercial companies is the maximization of the company's profit, even if the field of IM has been changing (Tidd, 2018).

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Garrigos, Igartua, and Peiro (2018) argue that it is important to consider the role of IM - Innovation Management techniques that impact the generation of incremental and radical innovation. Salter and Alexy (2014) highlight that innovation occurs via management, method and a system that enables innovation to happen in the organization. Authors such as Nonaka, Kodama, Hirose, and Kohlbacher (2013) address the importance of an innovation-friendly organizational environment.

Cooperatives are organizations, and their goal is the members' satisfaction. Such organizations face the dilemma of encouraging innovation without losing their fundamental principles (Novkovic, 2016). Thus, this paper is an effort to develop a model that meets the need for cooperatives. The article aims to propose a cooperative-specific IM framework.

This paper is justified in its theoretical scope because the theme of IM in cooperatives is still not being sufficiently studied. From a practical and economic point of view, 95% of Brazilian cities are served by cooperatives, twenty-two million Brazilians are served by health cooperatives and Brazilian cooperatives exported US\$ 2 billion in 2017, according to the Rio Grande do Sul State Cooperative Organization - OCERGS (2018).

To attend to the research goal, the authors started with Garcia's work (2010), who created a method of innovation management in commercial companies, and an original part of this research, to add cooperative identity, creating a new way of doing innovation management in cooperatives.

This research has as its starting point the work of Garcia (2010) and also aggregates many other authors of innovation management in commercial companies, which can be seen in Section 2.1, in chapter 2 (Theoretical Framing). The originality of this research is that it works deeply on cooperative identity, which can be seen in chapter 2, Section 2.2. This section is important, as it will serve as a basis for building a new way of innovation management in cooperatives.

Using this Theoretical Framing as a basis and using Design Science Research (DSR) as a method (which can be seen in chapter 3), it was possible to build in a theoretical and practical way innovation management in cooperatives, that is, the Coop Innovation Framework (which is found in chapter 4).

Ultimately, chapter 5, final considerations, approaches the main conclusions of the research; how the study contributes to the theoretical and practical field and indicates new possibilities for investigation.

2. Theoretical framing

This section presents the concepts and theories related to IM and the Cooperativism themes.

2.1. Innovation management

The field of IM has been going through changes; Tidd (2018) argues that it is necessary to identify the fundamental aspects of this discussion. Garrigos et al. (2018) argue that it is important to consider how IM techniques affect the generation of incremental and radical innovation. Salter and Alexy (2014) state the IM study is based on an understanding of the sources, nature, results of innovation, and the economic, technological, and social context in which it occurs. Although IM may be idiosyncratic, reflecting differences in the markets, technologies, resources, and capabilities of an individual organization, it is affected by the broader context in which it occurs. In an organizational environment, innovation is usually expressed through behaviors or activities that are tangible actions or outcomes (Dobni, 2008; Serra, Fiates & Alpersted, 2007; Deakins & Bensemann, 2018).

Another factor is generating significant knowledge that can drive creativity and innovation (Nonaka et al., 2013). For Moore (1993) ecosystem participants develop capabilities around a shared set of technologies, cooperate to innovate, and meet customer needs. The ability to collaboratively architect the ecosystem will be the future

competitive source for organizations (Dodgson, 2014; Iansiti & Levien, 2004).

Finally, the theme of IM is broad and can be worked on from different perspectives, being a form of debate the model presented by Garcia (2010), which has eight pillars as shown in Fig. 1. The Corporate System of Innovation - CSI aims to suggest an IM method, which in turn was inspired by Goffin and Mitchell (2010) with the Pentathlon Framework.

Garcia (2010) does not establish a presentation of the constructs in Fig. 1. However, to facilitate the understanding of the text, a presentation order of constructs was created: 1) Concepts and Goals; 2) Strategy; 3) Organizational Structure; 4) Method; 5) Indicators; 6) Knowledge Management; 7) Communication; 8) Open Innovation.

The Concepts and Goals (1) pillar considers that the theme of IM is interdisciplinary (Gambardella, Giuri & Torrisi, 2014). For Freeman (2003), the main element for innovation is intellectual capital. According to Schumpeter (1976), innovation can occur in several ways, namely as new product introductions or qualitative changes from existing ones; new process innovations; new market openings; new supply source developments; organizational changes.

The Organisation for Economic Co-operation and Development (OECD) (2005) postulates that innovation is a process that will result in something new for the company and can be classified as product innovation; process innovation; organizational innovation, and marketing innovation. In the same contextual way, Tidd et al. (2008) present the four innovation P's, where, in addition to product and process innovation, the authors suggest the concepts of position innovation and paradigm innovation. Thus, the Concepts/Objectives pillar seeks to direct the understanding of innovation in four ways: product, process, organizational, and marketing.

Regarding the Strategy (2) pillar, Gambardella, Giuri, and Torrisi (2014) contribute by dealing with technology markets, which can be sources for trading idle intangible assets and a means of obtaining new technologies. Mintzberg, Ahlstrand, and Lampel (1998) postulate that strategy is something different from planning, it is essential that IM, besides discussing its planning practices, has its place in the definition of business strategies.

According to Porter (1991), the strategy is based on the theory of competitive advantages. For the Resource-Based perspective (Grant, 1991), strategy refers to a company's resources and capabilities as something central. For Garcia (2019), technology is the foundation for a successful strategy. Thus, the Strategy pillar seeks to direct the discussion on new and differentiated innovation opportunities.

In the Organizational Structure (3) pillar, Franke (2014) deals with the increasing consideration of user experiences in innovation processes. Leonard and Barton (2014) highlight the importance of creativity in the innovation process. The organizational structure is relevant to promote the necessary clarity about how people are involved in the innovation process (Peters & Waterman, 1982). For Morgan (2007), organic or project-based models are starting to gain strength, as they are more

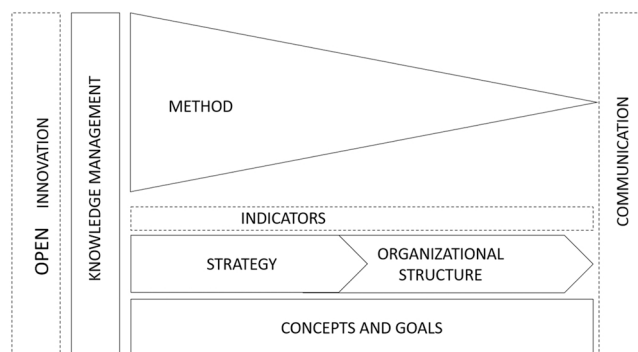


Fig. 1. Corporate System of Innovation, Source: Garcia (2010).

adapted to the realities of contemporary companies.

Goffin and Mitchell (2010) highlight organizational structure as one of the most relevant factors to consider in an IM model. The key issue is to find the balance between organic and mechanical options. Finally, the innovation search will be facilitated by a fluid organizational structure directed towards this goal.

The Method (4) pillar discusses the importance of science and technology for IM (McKelvey, 2014). Gibson & Skarzynsky (2008) discuss the importance of formal methods for evaluating ideas and opportunities. The Pentathlon Framework (Goffin & Mitchell, 2010) directs the discussion from an argument that the methodological structure will facilitate innovation. Also, Hansen and Birkinshaw (2007) present the Innovation Value Chain.

In the same vein, the Stage-gate process (Cooper, Edgett & Kleinschmidt, 2002) presents the steps that follow in the company. Another method that stands out is the Product Development Funnel (Wheelwright & Clark, 1992), where a flow is structured that takes as its starting point technological forecasts and market assessments. Verganti and Dell'era (2014) highlight the importance that design has been having in the innovation process.

Regarding the Indicators (5) pillar, Davila, Epstein, and Shelton (2007) highlight that the creation of performance and reward indicators encourages innovation. According to Oliveira (2010), there are two different approaches related to the ways of measuring the results in this area. The first is the quantitative view. The other is a combination of quantitative and qualitative view methods. Measurement of learning and post-project improvements is also valid (Wheelwright & Clark, 1992). Innovation is a complex and systemic challenge that involves a multi-dimensional effort and requires new training, tools, IT systems, indicators, values, and management processes (Gibson & Skarzynsky, 2008).

Regarding the Knowledge Management (6) pillar, Nonaka and Takeushi (1997) studied knowledge-creating companies and present the 'ba' concept where experiential interaction is what generates knowledge. Nonaka et al. (2013) point out that fractal organizations are those that can effectively perform 'ba'. Starting from the definitions and broadening the debate, Hansen, Nohria, and Tierney (1999) state that there are two strategies for acting in knowledge management: coding and personalization strategy. Tidd et al. (2008) defend as one of the pillars for IM the existence of spaces intended to stimulate creativity. Thus, knowledge management facilitates innovation based on the development of people.

In the Communication (7) pillar, marketing is seen as an input for innovation (Prabhu, 2014). In this sense, the process must be aligned with learning and experimenting with ideas (Peters & Waterman, 1982). It is important that leaders make clear their desire to innovate (Tidd et al., 2008). Communication can vary between two opposing points, the mechanistic and the organic (Burns & Stalker, 1961). The communication pillar enables fluidity to the other dimensions.

The Open Innovation (8) pillar highlights the importance of connections with other market players (Kastelle & Steen, 2014). Thus, it is relevant for innovation to go beyond company boundaries (Davila et al., 2007). The external relationship can generate benefits for organizations (Dyer, 2000), and gains should be considered as well as the open innovation concepts (Chesbrough, 2003;2007). Lastly, open innovation facilitates innovation by directing the organization to what is happening beyond the company's boundaries.

This literature review builds a framework for the theoretical categories necessary to analyze Innovation Management in a merchant company (Table 1).

The construction of the model presented here has its inspiration in the Pentathlon Framework (Goffin & Mitchell, 2010), which was reformulated by Garcia (2010).

In the first evaluation in a cooperative was used this framework, initially designed for market companies. The goal was to check if the model was adherent or not in cooperatives. The model wasn't adherent

Table 1
Theoretical Framework for Analysis of Corporate Innovation Management.

Theoretical Categories	Authors
Concepts and Goals	Gambardella, Giuri and Torrasi (2014); Freeman (2003); Schumpeter (1976); OECD (2005); Tidd et al. (2008); Dosi (1982); Salter and Alexy (2014).
Organizational Structure	Franko (2014); Leonard and Barton (2014); Peters and Waterman (1982); Morgan (2007); Mintzberg (2009); Goffin and Mitchell (2010).
Strategy	Gambardella, Giuri and Torrasi (2014); Mintzberg et al. (1998); OECD (2005); Porter (1991); Grant (1991); Nelson and Winter (1977); Goffin and Mitchell (2010); Garcia (2019).
Indicators	Davila et al. (2007);Oliveira (2010);Wheelwright and Clark (1992);Gibson and Skarzynsky (2008).
Communication Method	Prabhu (2014); Peters and Waterman (1982); Tidd et al. (2008); Burns and Stalker (1961). Goffin and Mitchell (2010); McKelvey (2014); Gibson & Skarzynsky (2008);Hansen and Birkinshaw (2007); Cooper et al. (2002); Wheelwright and Clark (1992); Smith & Reinertsen (1991); Verganti and Dell'era (2014).
Knowledge Management	Nonaka and Takeushi (1997); Nonaka et al. (2013); Hansen et al. (1999); Tidd et al. (2008).
Open Innovation	Kastelle and Steen (2014); Davila et al. (2007); Dyer (2000); Chesbrough (2003, 2007).

Source: Adapted Garcia & Forgiarini et al., (2010, 2018)

in cooperatives. For this, it's important to understand the peculiarities of a cooperative and understand which elements of cooperative identity can influence the management of innovation in cooperatives. The next section presents the theoretical framework on cooperative identity that can impact innovation management.

2.2. Cooperative identity

Cooperativism is a way of thinking that holds in the culture of cooperation the basis upon which all economic activities are built. The paradigm behind the cooperative consists of the primacy of the individual in the economy and cooperation for human development (Schneider, 2012). Values such as self-help, self-responsibility, democracy, equality, equity, and solidarity are developed among those who believe in this system (Bialoskorski, 2012; Kropotkin, 2009; Mladenatz, 2003; Münkner & Mateus, 2011; Namorado, 2000; Pinho, 2004). The experience known as the Rochdale Weavers is considered the first modern cooperative (Holyoake, 2014). This cooperative aimed to build a normative organization that also regards moral issues (Balbi-De-Gonzalo & Cracogna, 1985).

From the first moment, education was a pillar to promote this new way of seeing the world (Martin, 2005; Schneider, 1991). Thus, the cooperatives have in their mission the education, training, and information promotion of members and the public. The International Cooperative Alliance (ICA) was founded in 1895 to unite the world's cooperatives and promote cooperativism. The ICA expresses that cooperativism has as its values "self-help, personal responsibility, democracy, equality, equity, and solidarity" (ACI, 2015, p. 2). Despite global transformations of general nature, the foundations of cooperativism remain unchanged. The principles reflect cooperativism today in its theoretical composition agreed upon by the Centennial Congress and General Assembly in Manchester - England (ACI, 2015). Thus, the cooperativism principles are a) Voluntary and of free adherence; b) Democratic management by members; c) Economic participation of members; d) Autonomy and independence; e) Education, training, and information; f) Cooperation between cooperatives and g) Commitment to the community.

The principle of Voluntary and Free Membership is linked to the idea that cooperatives are voluntary organizations open to all persons able to use their services and willing to accept the association's responsibilities without gender discrimination, social status, race, political or religious belief (Kurimoto, 2016).

The second principle, Democratic Management by Associates, implies the difference between the cooperativism paradigm and the contemporary capitalist. In other words, regardless of the capital invested, in cooperativism, each person has the right to one vote, which in turn has equal weight among the members (Salvatori, 2012). Democratic management is the option to replace those who mismanage (Bialoskorski, 2012; Namorado, 2005; Schneider, 2012). It is through democratic management that cooperativism ensures the best way to remunerate work and thus comply with its 3^o principle: Economic Participation of Associates.

The debate on the third principle lies in the fact that the associate's economic participation is immersed in the idea that economic development is a means, not an end. For some cooperativism authors (Mladenatz, 2003; Münkner & Mateus, 2011; Namorado, 2000, 2005; Pinho, 2003, 2004; Schneider, 2012) the overvaluation of this principle reflects how one sees the world, which means, that understands the maximization of individual capital as an indicator of success. A cooperative needs several generations of members to allocate long-term resources without speculative spirit to achieve its objectives.

The fourth principle, Autonomy and Independence, ensures that no individual or corporation has greater decision-making power than the group of members. This measure is important to ensure that the cooperative does not lose its autonomy and independence for natural and/or legal persons.

The Education, Training, and Information principle is what most differentiates the cooperative from a commercial company because it deals with the factor that educates, forms, and informs about the organization type that the individual is part of. The three dimensions include education for cooperation, understanding cooperativism as a philosophy, and the cooperative democratic aspects (Drimer & Drimer, 1981; Schneider, 1999; 2003, Wilson & Shaw, 2016).

Cooperation among Cooperatives is based on the idea that "cooperatives serve their members more effectively and strengthen the cooperative movement by working together through local, regional, national and international structures" (Cheney et al., 2016, p. 1). Cooperation between cooperatives will sometimes require sacrifices to achieve common goals (Cheney et al., 2016, p. 1).

Commitment to the community integrates two cooperative values, elements contained in the ICA Declaration on Cooperative Identity: 'self-help and self-responsibility' and 'the ethical values of honesty, openness, social responsibility and commitment to others'. The cooperative success must also be evaluated in its ability to contribute to the communities' sustainable development (Cracogna, 2016).

The theoretical framework presented in Section 2.2 indicates the selected characteristics of the Cooperative Identity that impact the analysis of innovation management in the view of the authors of this article systematized in Table 2.

In the current section, the theoretical framework of IM and Cooperative Identity was discussed. Such construction provided the basis for the proposed new framework. The next section presents the methodological procedures that led to such a proposition.

3. Methodological procedures

This research used the Design Science Research (DSR) methodology. It is under the prism of the abductive method, more common when using Design Science (DS). A definition of DS is a science that seeks to develop and design solutions to improve existing systems, solve problems or even create new artifacts that contribute to better human performance (Le-Moigne, 1994). To understand DS, some basic conceptual alignments are required. The first is related to the 'artifact', which comes to be something constructed by man, an interface between the internal and external environment in each system (Simon, 1996). The purpose of DS is to generate systems that do not yet exist and solutions with a view to better results than previously obtained (Dresch et al., 2015).

Gill and Hevner (2011) present a process of artifact development. The flow starts on an instance called 'design space', where requirements and possible solutions to the problem must be analyzed. In the second layer, called 'artifact under construction', one must analyze the viability of the artifact, its usefulness, and its representations and, to follow it up, the new artifact must be effectively constructed. In the third layer, called 'use', you must start instantiating the artifact. For this research Artifact 1 is Fig. 1, presented in section two. This artifact is experienced and evolves into Artifact 2, which is ultimately discussed and analyzed in Fig. 5. The Synthetic Process of Cole et al. (2005) is presented in Fig. 2:

Fig. 2 shows that the first block is the identification of the problem, where two central aspects should be considered: understanding of the problem and the interest of those involved in its solution. The second block is the intervention, where the artifact must be applied to the problem situation. The third block is the evaluation, where the intervention and the artifact are evaluated. The last block is reflection and learning, where the whole process is discussed to identify the generation of knowledge (Dresch et al., 2015).

Following the guidelines of the Synthetic Process of Cole et al. (2005) four stages were operationalized: Identification of the problem; Intervention; Evaluation; Reflection and learning. In the identification stage of the problem, there was the appropriation of the Cooperative Identity, and the problem was analyzed. The Intervention stage occurred according to the suggestions of the authors of Artifact 1 (Garcia, 2010). The evaluation stage consisted of the analysis of the results of the

Table 2
Theoretical Framework of the Cooperative Identity in Relation to Innovation.

Theoretical Categories	Authors
Result for Members	Bialoskorski (2012); ACI (2015); Schneider (2019); Namorado (2000); Mladenatz (2003); Pinho (2004); Münkner and Mateus (2011); Forgiarini (2019).
Culture for Cooperation Education, Training and Information	Bialoskorski (2012); ACI (2015); Namorado (2000); Mladenatz (2003); Pinho (2004); Münkner and Mateus (2011); Forgiarini (2019). Schneider (1991; 1999; 2003); Martin (2005); ACI (2015); Drimer and Drimer (1981); Wilson and Shaw (2016); Forgiarini (2019).
Cooperation among Cooperatives	Cheney et al. (2016); Bialoskorski (2012); ACI (2015); Schneider (2019); Forgiarini (2019).

Source: Forgiarini et al. (2018) and Forgiarini (2019).

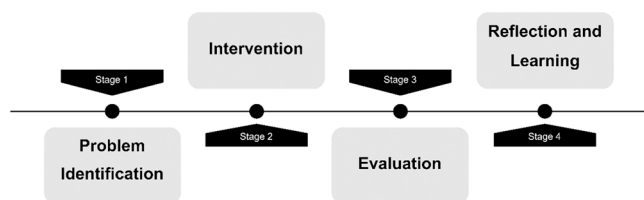


Fig. 2. Synthetic process, Source: Cole et al., (2005, p.17).

intervention. The goal of this stage was to verify the effectiveness of the implemented actions, so the diagnosis was reapplied, which comparing to the first allowed for such analysis.

The fourth stage, Reflection and Learning, was constructed from the final analysis of the experience with the cooperative and the final product of this stage was the proposition of Coop Innovation Framework (Artifact 2). The results are presented in the fourth section.

The choice for the case studied was guided by criteria that aimed at impartiality and met the objective of the research. The criteria were: 1) To be a cooperative formally constituted according to Brazilian Law 5.764/1971; 2) To be a cooperative with a high level of democracy; 3) To be a cooperative in need of change (Bressant & Tidd, 2009); This criterion also meets the first two stages of the synthetic process (March & Storey, 2008). 4) To be a cooperative classified in one of the four most representative types of cooperatives (number of members and/or employees), according to data from the OCERGS-SESCOOP/RS System, which are: Credit, Health, Infrastructure, and Transportation. In this case, the Delta⁵ Cooperative met the criteria established above. It is an Infrastructure cooperative type and, this cooperative type has 467,1 thousand members, being the third largest cooperative type in the Rio Grande do Sul regarding the number of members, according to data from the OCERGS-SESCOOP/RS System (2018). 5) The cooperative needed to accept the research proposal, the plan, and the schedule presented by the researchers. The group of respondents of the research included twenty-seven people (collaborators and cooperative members) from the cooperative, and at least one person being from each sector, according to the table below (Table 3):

After the selection of the case, the application of the proposal occurred according to the following steps (Fig. 3):

Source: Adapted and translated by Garcia (2010).

To build the diagnostics the Theoretical Framework for Analysis of Corporate Innovation Management was used, which was transformed into a survey (Table 4):

The responses followed the Likert scale: 1 (negative perception); 2 and 3 (intermediate perception) and 4 (positive perception). It should be noted that, following the DSR methodology, the first application was with the commercial company model. In the results, it will be discussed if it was adherent or not and if the peculiarities of the cooperative make

Table 3
Group of Respondents.

Political Structure	Board of Directors	Fiscal Council	Administrative Structure
President	Nine Board Members	Nine Board Members	Administrative Manager
Vice-President	Three Alternate Councillors	Three Alternate Councillors	Commercial Energy Manager
Secretary			Financial Manager
			Energy Distribution Center
			Communication Center
			Sector of People Management
			Quality Sector

Source: Prepared by the authors.

this model need to be reconstructed based on the characteristics of the cooperative.

4. Results and discussions

This section is structured according to Fig. 2, so the subsections are identification; intervention; assessment, reflection, and learning.

4.1. Stage 1: Problem identification

The identified problematization carried out in this research lies in the rationalization of a method that allows generating and adding value to the cooperative member's work through the IM, starting from the Cooperative Identity. Therefore, IM models, which start from the conventional way of seeing the world, are not suited to such a peculiar organization. Thus, this research seeks to suggest a model that can catalyze innovation in Cooperatives and for this used an initial IM model (Artifact 1) for intervention (Stage 2) and in the function of this, proposed the Coop Innovation Framework (Artifact 2) accordance with the cooperative identity.

4.2. Stage 2: Intervention

The first step (Step "A") of the intervention consisted of an "innovation workshop with managers and cooperative members". In the second step (Step "B") occurred the 'application of the diagnosis', which was performed. In the third moment (Step "C") occurred the 'closing of the diagnosis'. The fourth step (Step "D") was the current situation, and the exposition of the results, which were presented and discussed with the cooperative. For this stage, the questions presented in Table 4 were applied. The respondent could score from 1 (negative perception) to 4 (positive perception), indicating their perception of the cooperative for each question presented. This process occurred in two moments, individually and in groups. The results presented indicated very high similarity between the two responses (individual and group), for this reason, we chose to use only the responses of the groups, represented in Fig. 4.

⁵ Fictitious name to protect the identity and data of the cooperative.

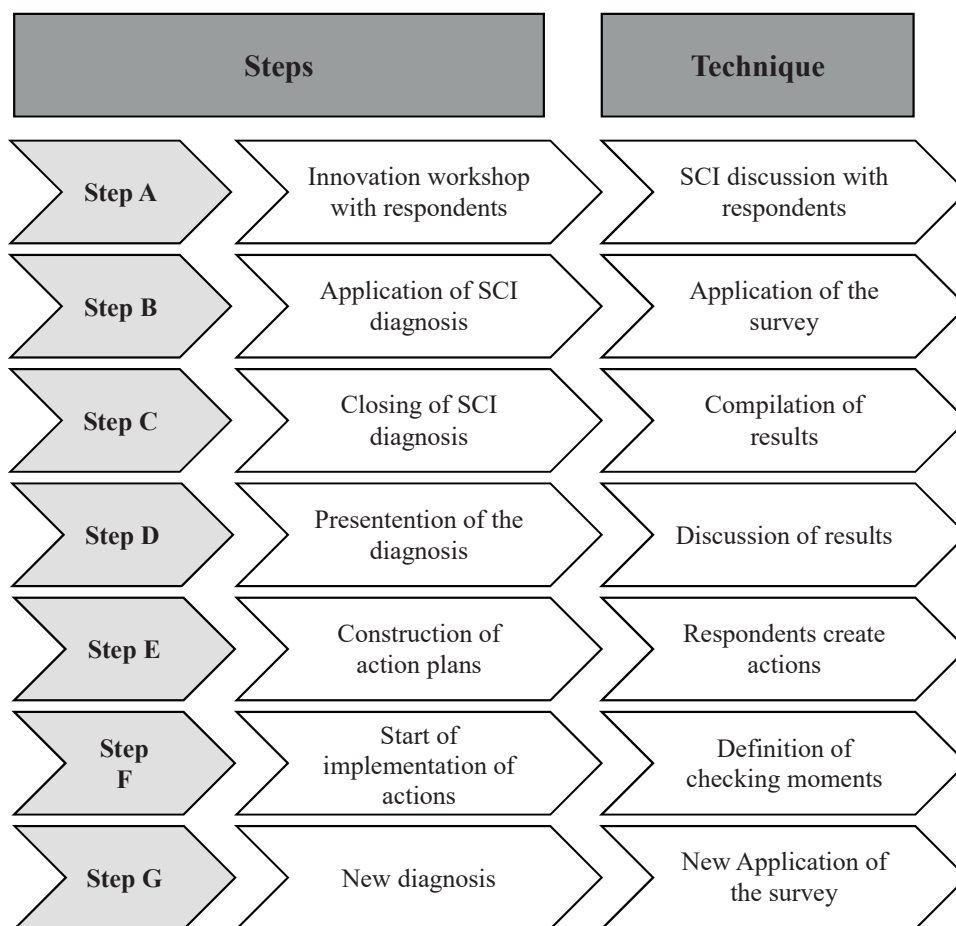


Fig. 3. Stage 2 - Steps.

The fourth step (Step “D”) result is presented below. In this representation, the positive perception symbolizes the fulfillment of the pillar requirements, the intermediate perception would represent the intermediate service level, and the negative perception would characterize the non-fulfillment. The results of the individual research were close to the results of the group, so only the group survey data was chosen to be presented in Fig. 4.

The respondent groups of the questionnaire that generated Fig. 4 were randomly assembled. In the Concept/objective pillar, four groups positioned the cooperative at an intermediate level and one group positioned it at a critical level; In the Strategy pillar, four groups positioned the cooperative at an intermediate level and one group positioned it at a critical level; In the Organizational Structure pillar, the five groups ranked the cooperative at an intermediate level; In the Method pillar, one group rated the cooperative at an intermediate level and the other four groups rated it as critical; In the Indicator pillar, three groups understood that the cooperative would be at a critical level, one group classified it at an intermediate level and another group understood that the cooperative met the requirements of the item; In the Knowledge Management pillar, four groups positioned the cooperative at a satisfactory level and one group positioned it at the intermediate level; In the Communication pillar, the five groups classified the cooperative as intermediate; In the Open innovation pillar, the five groups rated the cooperative as critical.

In Step “E” occurred the ‘construction of the action plan’, where the improvement points were identified, and an improvement plan of the respective aspects was elaborated. At this step 14 projects were prepared, two of them for each of the pillars of the Corporate System of Innovation (Artifact 1). The projects are in Table 5:

In the sixth step (Step “F”) there was the ‘implementation of action

plans’, where thirteen projects were successfully implemented while one of them failed (project 10). The last step of the intervention (Step “G”) was a new application of individual and group questionnaires. The process followed the same way used in Step “D.” Again, only the group responses were used. The following is Fig. 5 with the results.

In the Concept/objective pillar, the five groups positioned the cooperative at an intermediate level; In the Strategy pillar, the five groups positioned the cooperative at an intermediate level; In the Organizational Structure pillar, the five groups ranked the cooperative at an intermediate level; In the Method pillar, the five groups classified the cooperative at an intermediate level; In the Indicator pillar, two groups understood that the cooperative did not meet the requirements and three groups rated it at an intermediate level; In the Knowledge Management pillar, the five groups classified the cooperative as intermediate; In the Communication pillar, four groups classified the cooperative as intermediate and one group classified it as satisfactory; In the Open innovation pillar, the five groups rated the cooperative as critical.

Fig. 5 shows the achieved results at Delta Cooperative after project implementation, thus concluding the intervention. The next section presents the assessment of these results.

4.3. Assessment

In the current section, the intervention assessment is first developed and then the artifact is analyzed.

The first pillar, Concepts/Goals, has completely yellow results, which means it meets intermediate-level requirements. It can be said that the cooperative considers it important to balance project portfolios for innovation, as suggested by Dodgson, Gann & Phillips (2014), but the cooperative does not have systematic practices yet. The organization is

Table 4
Research Instrument.

Research Instrument for Diagnosis of Corporate Innovation Management		Authors
Theoretical Categories	Questions	
Concepts and Goals	1 A: Do your company managers and employees know the concepts of innovation (product, process, organizational and marketing)? 1B: What is innovation for the company?	Gambardella, Giuri and Torrissi (2014); Freeman (2003); Schumpeter (1976); OECD (2005); Tidd et al. (2008); Dosi (1982); Salter and Alexy (2014).
Strategy	2 A: Is innovation one of the main objectives of the company's board? 2B: Does the company allocate resources (people, time, funds) for actions related to innovation?	Gambardella, Giuri and Torrissi (2014); Mintzberg et al. (1998); OECD (2005); Porter (1991); Grant (1991); Nelson and Winter (1977); Garcia (2019).
Organizational Structure	3 A: Is there an excessively hierarchical culture in the company? 3B: How does the company's culture deal with ERROR (ideas or projects that didn't work)?	Franke (2014); Leonard and Barton (2014); Peters and Waterman (1982); Morgan (2007); Mintzberg (2009); Goffin and Mitchell (2010).
Method	4 A: Are there tools for evaluating ideas? 4B: Are there clear rules (formalized, registered and know to everyone) for evaluating ideas?	Goffin and Mitchell (2010); Mckelvey (2014); Gibson & Skarzynsky (2008); Hansen and Birkinshaw (2007); Cooper et al. (2002); Wheelwright and Clark (1992); Smith & Reinertsen (1991); Verganti and Dall'era (2014).
Indicators	5 A: Are there indicators that measure innovation? 5B Is billing for products/services launched in the last 2 years monitored by the board?	Davila et al. (2007);Oliveira (2010);Wheelwright and Clark (1992);Gibson and Skarzynsky (2008).
Communication	6 A: Does the board communicate that it wants to innovate for all employees? 6B: How is communication between leaders and followers?	Prabhu (2014);Peters and Waterman (1982);Tidd et al. (2008);Burns and Stalker (1961).
Knowledge Management	7 A: Are there practical actions for the development of people's knowledge? 7B: Are there physical or virtual spaces for the development of knowledge?	Nonaka and Takeushi (1997);Nonaka et al. (2013);Hansen et al. (1999);Tidd et al. (2008).
Open Innovation	8 A: Is there an employee responsible for monitoring the innovations that happen in the company's market? 8B: Does the company participate in any innovation network or develop studies with external institutions?	Kastelle and Steen (2014);Davila et al. (2007);Dyer (2000); Chesbrough (2003; 2007).

Source: Garcia (2010) and Forgiarini et al. (2018)

aware that the basis for innovation lies in intellectual capital, as suggested by Freeman (2003), but has no initiatives to operationalize it.

Regarding the Strategy pillar, the cooperative has had completely yellow results, which means that it knows the existence of markets for obtaining new technologies, as Gambardella et al. (2014) suggest, but still does not use them. The cooperative understands that strategy is different from planning and has a management practice focused on it (Mintzberg et al., 1998), but the innovation issue is still not so much addressed. It is aware that resources need to be managed for innovation (Grant, 1991), but has not taken action yet.

In the Organizational Structure pillar, the cooperative has completely yellow results, which means partial fulfillment of the requirements. The cooperative is aware of the importance of considering the users' experience (Franke, 2014), but has no method to accomplish this. The cooperative is clear about the role of people in the creative process, and consequently innovation (Leonard & Barton, 2014). The organizational culture showed timid signs of being participatory and open to dialogue, insufficient in the views of Morgan (2007) and Martin (2005) who warn that it is necessary to enhance the cooperative culture that is naturally participatory and open to dialogue.

In the questions related to the Method what prevailed was the color yellow. As Mckelvey (2014) points out, science and technology are bases for IM, and the intervention enabled the cooperative to build initiatives on these issues. Gibson and Skarzynsky (2008), Goffin and Mitchell (2010), Hansen and Birkinshaw (2007), Cooper et al. (2002), Wheelwright and Clark (1992), Smith and Reinertsen (1991) bring models, frameworks, concepts, and theories that highlight the importance of structured methods for innovation to happen.

In the Indicators occurred a yellow predominance, but there is a considerable red color position, indicating the incipience of the innovation measurement process. Indicators are important to the innovation process, without them it is difficult to understand where you are, where you are going, and what your goal is. This is the general argument line of authors Davila et al. (2007) and Oliveira (2010) about this theme. The construction of the metrics must take into account the cooperative's function, which is not to generate profit but to fulfill the cooperative member (Schneider, 1999, 2012; Flaviano, Löbler & Avelino 2014; OCB 2016; Knutson, 1966; Cook, 1995).

In Knowledge Management, there was also a high intermediate level incidence, that is, yellow color. There is some evidence of the existence of "ba" (Nonaka & Takeushi, 1997), but still far from what Nonaka et al. (2013) call fractal organizations. There are some initiatives for codifying explicit knowledge (Hansen et al., 1999). Aligned with Tidd et al. (2008) in the cooperative are being developed some spaces intended to stimulate creativity, but still at a very early stage. The principle of education, training and information (ACI, 2015) is something that can be used for this pillar's development.

Communication was mostly yellow, despite the occurrence of green, which indicates an intermediate development level. It was identified that the cooperative understands the importance of marketing as input for innovation (Prabhu, 2014; Tidd et al., 2008). However, there is still no process of aligning learning with the experimentation of ideas (Peters & Waterman, 1982). There is evidence that communication in the cooperative is at an intermediate level to the advanced between the mechanist and the organic (Burns & Stalker, 1961).

The last factor assessed was Open innovation where there was a red level predominance, indicating the inexistence or irrelevance of this process in the cooperative. This aspect highlights the importance of connecting with external players as a way to catalyze the firm's innovation. In general, these are the authors' arguments: Brown and Mason (2014); Kastelle and Steen (2014); Wang et al. (2017); Malerba and Adams (2014); Chesbrough (2003, 2007), being Open Innovation diagnosed as practically non-existent in the cooperative. According to Pinho (2004) and ACI - Alianza Cooperativa Internacional, 2015, cooperation among cooperatives and commitment to the community may indicate paths for the development of open innovation in the cooperative.

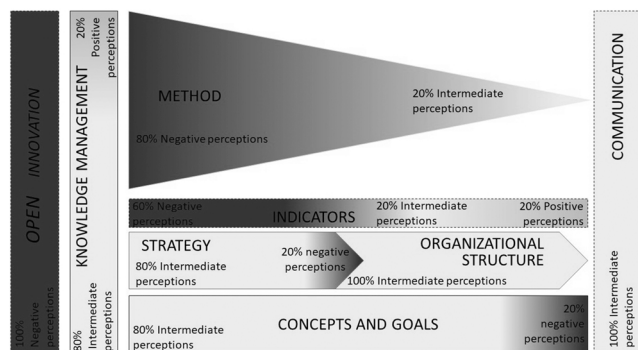


Fig. 4. Step D.
Source: Prepared by the authors.

Table 5
Projects.

PROJECTS
1) Dissemination of innovation concepts to all employees.
2) Inclusion of the innovation theme in the strategy map and systematization of the innovation committee.
3) Research on organizational culture that encourages innovation.
4) Technical visits to cooperatives and innovative commercial companies.
5) Technical visits to same branch companies as the cooperative, but which stand out technologically.
6) Dissemination of innovation news with employees and cooperatives.
7) Structuring an idea management system.
8) Creation of an internal program to capture ideas from employees and members.
9) Search for events in the area of innovation in the region.
10) Structuring a knowledge management system for innovation.
11) Structuring a method for managing technical ideas, specific to the engineering area.
12) Creation of metrics for innovation measurement.
13) Search for class entities that encourage innovation and that can be accessed by the cooperative.
14) Inclusion of the theme of innovation in the agenda of the cooperative board discussions through the direct involvement of counselors in the technical project's debates.

Source: Prepared by the authors

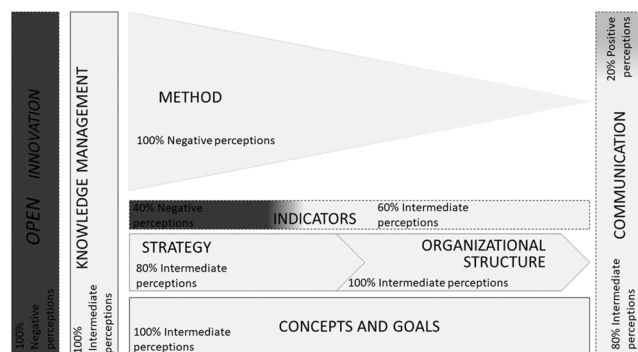


Fig. 5. Step G.
Source: Prepared by the authors.

The assessment indicated that some pillars were relatively appropriate and others not. However, although Artifact 1 assisted the cooperative studied, it has no consonance with the cooperativism principles. In the next section, a new artifact is proposed.

4.4. Reflection and learning

From the Artifact 1 perspective, the assessment showed that it was not sufficiently designed for an approach in the cooperativism field. This

situation arose because: i) The theoretical basis of the strategy aspect is focused on generating profits; ii) The organizational structure pillar was theoretically insufficient to generate innovation; iii) The indicators aspect was more linked to the method than effectively a pillar, which means this topic is properly solved through the practice of metrics included in traditional IM methods; iv) The knowledge management is how the organization produces and keeps assets for profit generation in the organization. This topic is more appropriate in the cooperative context, through the Education, Training, and Information principle.

New factors were included after the elimination of the four blocks described above, which generated a new framework. The included topics were: i) Education, Training, and Information. Its presence in the framework is important because, through the result of human assets training, the cooperative will be able to develop knowledge-based innovation; ii) Culture for Cooperation, which is based on cooperativism; iii) Cooperation among Cooperatives, which is also a principle of cooperativism; iv) Results for the cooperative member should be the cooperative's. With that we have a new framework (Table 6):

Given these explanations, Fig. 6 presents the Coop Innovation Framework, which is detailed below. The interpretation of the figure is carried out from the bottom up on three levels. The first three axes (Culture for cooperation; Education, Training, and Information; Cooperation among Cooperatives) are components of the cooperative identity that can boost the innovation management in cooperatives.

The central part (Method, Communication; Strategy; Concepts and Objectives; Open Innovation) is directly related to generic elements of Innovation Management. In the central part, the method has special attention, as it is characterized by how the cooperative will carry out the management of innovation considering the first three axes. For the proper realization of the method, the communication, and the strategy need to be in synergy, connecting the sectors and the objectives of the cooperative. This process should lead to the positioning of the cooperative as an innovative organization, reinforcing the concepts and objectives of cooperative identity and innovation, as well as carrying out open innovation.

The upper part (Results for Members) reflects the ultimate objective of the cooperative, that is, to bring results to the cooperative members through the cooperative identity and innovation management, and for this reason, this is the axis at the top.

The Coop Innovation Framework was the result of CSI's reflection on the cooperativism logic. The first difference is that it is no longer treated in pillars but in topics of a synergistic system. The basis of this new model is the culture of cooperation. Innovation happens in diversity because when different players network and value each other, in a cooperative spirit, they create a favorable environment for innovation (Forgiarini, 2019; Garcia, 2019; Johnson, 2010). Cooperation is one of the cooperativism bases, that is, the goal of innovation, in this case, is due to its value added to the work that will be collectively built (Schneider, 2012).

Starting from the logic that cooperation is the basis for innovation, it is soon expected that cooperation among cooperatives is the next step. In this logic, cooperation among cooperatives allows similar organizations to share and enhance learning and innovation gains. The cooperatives' competition should not be between cooperatives but between commercial companies (Cheney et al., 2016).

The Education, Training, and Information topic makes its relevance clear, as it is necessary that cooperative development agents are educated on the differences between cooperativism and the current system in force (Forgiarini, 2019; Schneider, 2012; Wilson & Shaw, 2016).

These three topics are fundamental to IM in cooperatives within the Coop Innovation Framework logic. This basis, together with the topic that highlights the ultimate goal of this framework changes the CSI logic, which was intended only for commercial companies.

The aspect of Concepts/Objectives deals with the understanding that the cooperative has about innovation. The cooperative needs to be clear

Table 6
Theoretical Framework for Analysis Management of Innovation in Cooperatives.

Innovation management dimension		Cooperative identity dimension	
Theoretical Categories	Authors	Theoretical Categories	Authors
<i>Concept and Goals</i>	Gambardella et al. (2014); Freeman (2003); Schumpeter (1976); OECD (2005); Tidd et al. (2008); Dosi (1982); Salter and Alexy (2014).	<i>Result for Members</i>	Bialoskorski (2012); ACI (2015); Schneider (2019); Namorado (2000); Madenatz (2003); Pinho (2004); Münkner and Mateus (2011); Forgiarini (2019).
<i>Open Innovation</i>	Kastelle and Steen (2014); Davila et al. (2007); Dyer (2000); Chesbrough (2003; 2007).	<i>Culture for Cooperation</i>	Bialoskorski (2012); ACI (2015); Namorado (2000); Madenatz (2003); Pinho (2004); Münkner and Mateus (2011); Forgiarini (2019).
<i>Strategy</i>	Gambardella et al. (2014); Porter (1991); Mintzberg et al. (1998); OECD (2005); Grant (1991); Nelson and Winter (1977); Goffin and Mitchell (2010); Garcia (2019).	<i>Education, Training and Information</i>	Schneider (1991; 1999; 2003); Martin (2005); ACI (2015); Drimer and Drimer (1981); Wilson and Shaw (2016); Forgiarini (2019).
<i>Communication</i>	Prabhu (2014); Peters and Waterman (1982); Tidd et al. (2008); Burns and Stalker (1961).	<i>Cooperation Among Cooperatives</i>	Cheney et al. (2016); Bialoskorski (2012); ACI (2015); Schneider (2019); Forgiarini (2019).
<i>Method</i>	Goffin and Mitchell (2010); Mckelvey (2014); Gibson and Skarzynsky (2008); Hansen and Birkinshaw (2007); Cooper et al. (2002); Wheelwright and Clark (1992); Smith & Reinertsen (1991); Verganti and Dell'era (2014).		

Source: Prepared by the authors.

to all players involved what innovation is for it, if it is all these factors, or just some of them, and what is their goal with innovation. Experience in the cooperative studied showed that the lack of a clear concept meant that the cooperative did not have a goal on the subject, which generated significant mismatches.

Open Innovation continues to address the network importance with other market players to search and understand innovation (Kastelle & Steen, 2014). Wang et al. (2017) address the importance of weak ties for innovation, these ties are those with companies or people who provide the connections that contribute to inventions becoming innovations. Malerba and Adams (2014) state the importance of sectoral innovation systems as a path to open innovation, which reinforces Davila et al. (2007) position that innovation must go beyond the organization. The external relationship can generate benefits for organizations (Dyer, 2000) and such gains should be considered, as well as the open innovation concepts (Chesbrough, 2003; 2007).

Communication is seen as an input for innovation (Prabhu, 2014). When communication is at the service of learning and ideas experimentation, it creates another factor to improve the innovation environment (Forgiarini, 2019; Peters & Waterman, 1982). Experience at Delta Cooperative has made it clear that the framework's success has been achieved through a communication process that utilizes IT and internal communication tools.

Regarding the Strategy topic, the concept remained that if innovation is not linked to the cooperative strategy, it will be difficult to generate an enabling environment for innovation. Experience with Delta Cooperative reinforced what Porter (1991), Grant (1991), and Goffin and Mitchell (2010) said, that is, the cooperative took a step forward when it considered innovation as a source of competitive advantage. This topic has only been transformed regarding the strategy's objective, which is no longer profit for the company, but for the member's fulfillment.

With regards to Method, the Delta Cooperative experience reinforced what Mckelvey (2014) stated, which is an important science and technology for innovation. In Delta cooperative, it was necessary to have a



Fig. 6. Coop Innovation Framework.
Source: Prepared by the authors.

Table 7
Research Instrument for Diagnosis of Innovation in Cooperatives.

Research Instrument for Diagnosis of Corporate Innovation Management		
Theoretical Categories	Questions	Authors
<i>Culture for Cooperation</i>	1 A: Does the organizational culture encourage people's participation in actions related to cooperation for innovation? 1B: Do the leaders of the cooperative value the participation and diversity of the team?	Bialoskorski (2012); ACI (2015); Namorado (2000) ; Mladenatz (2003) ; Pinho (2004) ; Münkner and Mateus (2011); Forgiarini (2019) .
<i>Education, Training and Information</i>	2 A: Does the cooperative educate for the culture of cooperation and innovation? 2B: Does the cooperative provide training for innovation for its employees and members? 2 C: Are the cooperative's data and information available to the internal and external public?	Schneider (1991; 1999; 2003); Martin (2005) ; ACI (2015); Drimer and Drimer (1981) ; Wilson and Shaw (2016) ; Forgiarini (2019) .
<i>Cooperation among Cooperatives</i>	3 A: Are there cooperation practices with other cooperatives? 3B: Are there innovation practices with other cooperatives?	Cheney et al. (2016) ; Bialoskorski (2012); ACI (2015); Schneider (2019); Forgiarini (2019) .
<i>Concept and Goals</i>	4 A: Are the concepts of innovation (product, process, organization, and marketing) clear to a cooperative team? 4B: The cooperative council seeks to be an "innovative cooperative"?	Gambardella et al. (2014) ; Freeman (2003) ; Schumpeter (1976) ; OECD (2005); Tidd et al. (2008) ; Dosi (1982) ; Salter and Alexy (2014) .
<i>Open Innovation</i>	5 A: Are there systematic practices of looking at the market, and the business world and looking for inputs for innovation? 5B: Are there innovation projects being developed with other organizations outside the cooperative system?	Kastelle and Steen (2014) ; Davila et al. (2007) ; Dyer (2000) ; Chesbrough (2003; 2007).
<i>Strategy</i>	6 A: Is innovation on the agenda of the cooperative's strategic discussions? 6B: Are there any innovation projects that are accompanied by the cooperative's planning?	Gambardella et al. (2014) ; Porter (1991) ; Mintzberg et al. (1998) ; OECD (2005); Grant (1991) ; Nelson and Winter (1977) ; Goffin and Mitchell (2010) ; Garcia (2019) .
<i>Communication</i>	7 A: Is there an innovation theme in the cooperative's internal communication? 7B: Is the cooperative perceived by the market as innovative?	Prabhu (2014) ; Peters and Waterman (1982) ; Tidd et al. (2008) ; Burns and Stalker (1961) .
<i>Method</i>	8 A: Is there a formalized method that records ideas and allows them to become innovation projects? 8B: Is there a method that seeks technological innovations applied in the cooperative's area of operation?	Goffin and Mitchell (2010) ; Mckelvey (2014) ; Gibson and Skarzynsky (2008) ; Hansen and Birkinshaw (2007) ; Cooper et al. (2002) ; Wheelwright and Clark (1992) ; Smith & Reinertsen (1991) ; Verganti and Dell'era (2014) .
<i>Results for Members</i>	9 A: Do members perceive results from innovation? 9B: Does innovation impact the cooperative's results?	Bialoskorski (2012); ACI (2015); Schneider (2019); Namorado (2000) ; Mladenatz (2003) ; Pinho (2004) ; Münkner and Mateus (2011); Forgiarini (2019) .

Source: Prepared by the authors.

formal step-by-step approach to what should be done (Gibson & Skarzynsky, 2008). For this, employees were instructed to create their own method based on the Pentathlon Framework (Goffin & Mitchell, 2010), Value Chain (Hansen & Birkinshaw, 2007), and Stage-gates (Cooper et al., 2002).

That is why it is possible to present the new research instrument, which considers the dimension of cooperativism (Table 7):

Answers must follow the Likert scale. The cooperative differs from the commercial companies because the second focuses on their efforts to bring returns on capital and the cooperative focuses its efforts on fulfilling the cooperative member and this transforms the whole logic of rationality behind innovation. Even if the project does not generate greater financial resources for the cooperative, if it generates fulfillment for the cooperative member, the project must be maintained. In the Cooperative, capital is a means and not an end. Innovate not only to generate capital but also innovate to generate a pleasant and happy environment for the members and players involved (Bancel, 2016; Cheney et al., 2016; Cracogna, 2016; Draperi, 2016; Kurimoto, 2016; Mladenatz, 2003; Novkovic, 2016; Schneider, 2012; Wilson & Shaw, 2016). The final considerations are presented in the next section.

5. Final considerations

The aim of the present study was to propose a specific IM framework for cooperatives. Thus, a first diagnosis was made in Delta cooperative, projects were elaborated and executed, and a new diagnosis was made after the intervention. What happened was that Artifact 1 (Fig. 1), despite having good results in the application, proved fragile for cooperatives, so Artifact 2 (Fig. 6) was proposed.

Thus, the study concluded that: a) The results for the object of study (Delta Cooperative) were relatively positive, as there was a substantial improvement in its position regarding innovation; b) Although Artifact 1 is applicable to cooperatives, it does not fully meet expectations from the cooperativism perspective; c) The study indicates that the new artifact proposition is appropriate: Coop Innovation Framework (Artifact 2/ Fig. 6).

Different models of innovation in cooperatives were developed in the literature, each covering or focusing on specific aspects of this phenomenon, while others neglected them. To advance the understanding of this phenomenon, a comprehensive model was elaborated.

Unlike other models, the basis of this is the culture of cooperation, which should guide the search for innovation. As pillars for the development of this search, we present cooperation in cooperatives and education, training, and information. These 3 topics are fundamental in our cooperative innovation logic, based on cooperative identity. It is understood that cooperative identity is the basis for innovation management in cooperatives.

Next, the model seeks to know the drivers of innovation, with the pillars of concepts and objectives, and of open innovation. At the heart of the process is the search to understand what method the organization uses to build its innovation management and whether this effort is being communicated in a clear way (communication) and whether it is present in the organization's strategy.

And all this only makes sense if it brings social and economic results to members' goal end and a cooperative that actually follows the cooperative identity. It is noteworthy that it is common in Brazil for cooperatives to pursue economic results for the organization and almost nothing for the cooperative.

The absence of holistic models with a comprehensive view of innovation in cooperatives makes it difficult to explore, evaluate and compare this construct, especially in cases where cooperative identity is not considered. For researchers, the absence of a broader model requires efforts to integrate existing models into the literature to develop empirical studies. In this sense, the model presented here brings three important contributions. First, for researchers, a model is offered that can be used in empirical studies. Secondly, for managers, a systemic tool

is provided for analysis of the innovation process in cooperatives. Also for managers, the model presented is useful because it is operational and can be used for longitudinal analysis of innovation development. Third, the formulation of this model represents a methodological contribution to innovation studies in cooperatives.

Although criteria have been adopted to ensure the robustness of the study and the proposed model provides relevant information on innovation in cooperatives, it also has some limitations. The main caveats are especially associated with cross-case analysis, the relatively modest number of experts interviewed, and the nature of the research, which limits generalizations. Thus, for future studies, we recommend improving the model, using different conditions for field testing, as well as developing classification metrics. Quantitative studies can provide relevant information on the effective functioning of the model, and longitudinal studies can provide more comprehensive analyses of innovation development.

Data availability

Data will be made available on request.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.jcom.2022.100185](https://doi.org/10.1016/j.jcom.2022.100185).

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