

# The absorptive capacity of incubated enterprises and innovation actions in the context of agribusiness in Paraíba, Brazil

## Capacidade absorptiva de empreendimentos incubados e as ações de inovação no contexto de agronegócios paraibanos

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## Abstract

**Purpose:** This article analyzes companies' absorptive capacity and innovation actions incubated in the Agribusiness Incubator of Cooperatives, Community Organizations, Associations, and Rural Settlements of the Semi-arid Region of Paraíba (Iacoc).

**Originality/value:** The value of this research is the validation of the literature and the process' effectiveness of fostering incubators with incubated enterprises, whose transfer of resources/knowledge can generate innovation. We present the theoretical relationship between absorptive capacity and innovation actions in the context of incubated enterprises, inspiring management practices for different types of innovation, including in specific contexts, such as agribusiness.

**Design/methodology/approach:** We carried out a qualitative multicase study whose analysis focused on six projects incubated at Iacoc. Documentary research and semi-structured interviews with the leading managers were used, and the ATLAS.ti software processed the data. Subsequent content analysis framed the data into four main categories: absorptive capacity combined with the product, marketing, process, and organizational innovations.

**Findings:** Results show that the analyzed projects presented advancements from the absorptive capacity realized, with the generation of innovations in management and planning, people management, the direction of production techniques, product design characteristics, and access to markets. We argue that the theoretical association of the field of absorptive capacity and innovation in the context of incubated enterprises can trigger substantial gains for the thematic area and the actors of innovation ecosystems: the capture of knowledge by companies, innovation actions, the transformation of those involved in the initiatives and socioeconomic impact.

**Keywords:** absorptive capacity, innovation, incubator, agribusiness, socioeconomic impact



## Resumo

**Objetivo:** Este artigo analisa a capacidade absorptiva e as ações de inovação de empresas incubadas na Incubadora de Agronegócios das Cooperativas, Organizações Comunitárias, Associações e Assentamentos Rurais do Semiárido da Paraíba (Iacoc).

**Originalidade/valor:** O valor desta pesquisa é a validação da literatura e efetividade do processo de fomento de incubadoras aos empreendimentos incubados, cuja transferência de recursos/conhecimento pode gerar inovação. Apresentamos a relação teórica entre a capacidade absorptiva e as ações de inovação no contexto de empreendimentos incubados, inspirando práticas de gestão para inovações de diversos tipos, inclusive em contextos específicos, como o do agronegócio.

**Design/metodologia/abordagem:** Realizamos um estudo multicase qualitativo, cujas análises se concentram em seis empreendimentos incubados na Iacoc. Foram utilizadas pesquisa documental e entrevistas semi-estruturadas com os principais gestores, sendo os dados processados pelo *software* ATLAS.ti. Posterior análise de conteúdo enquadrou os dados em quatro categorias centrais: capacidade absorptiva realizada aliada às inovações de produto, de marketing, de processo e organizacional.

**Resultados:** Os resultados mostram que os empreendimentos analisados apresentaram avanços a partir da capacidade absorptiva realizada, com a geração de inovações em gestão e planejamento, gestão de pessoas, direcionamento de técnicas de produção, em características de concepção de produtos e acesso a mercados, entre outros. Defendemos que a associação teórica do campo da capacidade absorptiva e a inovação no contexto de empreendimentos incubados podem desencadear ganhos substanciais ao campo temático e aos atores de ecossistemas de inovação: captação de conhecimento pelas empresas, ações de inovação, transformação dos envolvidos nas iniciativas e impacto socioeconômico.

**Palavras-chave:** capacidade absorptiva, inovação, incubadora, agronegócio, impacto socioeconômico

## INTRODUCTION

For an adequate holistic view, companies need to know how to deal with the knowledge they have and envision having and how innovative it is to sustain them. In this regard, the absorptive capacity, resulting from the initial contribution of Cohen and Levinthal (1990), is an important vector, as it acts as an ability to recognize the value of new information, assimilate, and direct it – initially foreseen only for commercial purposes. Therefore, it is assumed that the absorptive capacity can be an innovation enhancer (Apriliyanti & Alon, 2017; Cassol et al., 2017; Engelman & Schreiber, 2018; Zhang et al., 2015).

Zahra and George (2002) argue that absorptive capacity has two dimensions: potential absorptive capacity (Pacap) and realized absorptive capacity (Racap). The potential absorptive capacity makes the company receptive to acquiring and assimilating external knowledge, but it does not guarantee its exploitation. On the other hand, the absorptive capacity realized is the company's capacity to explore and transform the acquired knowledge to develop new practices. In this understanding, this research adopts the absorptive capacity realized, recognizing that the companies went through the previous stages of the potential absorptive capacity and were able to explore well the acquired knowledge.

McCann and Folta (2018) point out that, although other elements can lead to different innovative performances, the absorptive capacity can be an essential driver in understanding the differences in the asymmetrical use of knowledge and its application in innovations. It is a crucial vector for innovation theories and a strong predictor of innovation and knowledge transfer within firms (Koch & Strotmann, 2008; Zou et al., 2018).

Innovation is now considered an activity that starts with developing an initial element until its transformation into a commercially valuable component accepted in the social system (Schumpeter, 1997). The minimum requirement to define innovation is that the product, process, marketing, or organizational method are new or significantly improved for the company ((Organisation for Economic Co-operation and Development [OECD] & Eurostat, 2018).

The Organization for Economic Cooperation and Development (OECD & Eurostat, 2018), through the *Oslo Manual: Guidelines for the Collection and Interpretation of Data on Innovation*, distinguishes four types of innovation: product, process, marketing, and organization. Thus, for innovation classification, we accept the Oslo Manual typology to guide the analysis of this

research, with the types of innovation brought from the 4th edition of the Manual being a more precise formulation for use with companies (OECD & Eurostat, 2018).

Studies that analyze the link between absorptive capacity and innovation are increasing in the literature and have presented contributions in incubated companies (Cassol et al., 2017; Engelman & Schreiber, 2018). In this type of business, the absorptive capacity of resources is the vector for promoting innovation. In any case, the absorptive capacity proves to be flexible enough to be applied in different units of analysis and the most diverse fields of research.

According to Cassol et al.'s (2017) study, the authors found that knowledge is better used through absorptive capacity, significantly contributing to innovations in incubated enterprises. Despite the growth in research dedicated to the theme, these are generally theoretical or, if empirical, no evidence was identified that associates the absorptive capacity and the adoption of innovative practices in incubated rural enterprises, which justifies this research. These are projects directly related to community organizations, the management and management of natural resources, and the socio-economic context of communities, which benefit from innovative practices and sometimes need help to capture knowledge, carry out actions and expand their activities with the dynamics of innovation.

Given the above, the objective of this research is to analyze the absorptive capacity and the resulting innovation in companies incubated in the Agribusiness Incubator of Cooperatives, Community Organizations, Associations, and Rural Settlements of the Semiarid Region of Paraíba (Iacoc), an institution linked to the Study Program and Actions for the Semiarid Region (Peasa) of the Federal University of Campina Grande (UFCG) and the Paraíba Technological Park (PaqTcPB).

To achieve the objective of this research, a multicase study was carried out with a descriptive qualitative approach, whose collection sources were semi-structured interviews and document analysis. The relevance of this research lies in the validation of the results and effectiveness of actions to foster incubators as a tool for promoting family-based agribusiness ventures in the semiarid region, with possible use in other contexts. Empirically, the processes presented here are capable of inspiring management models for these initiatives.

The ventures chosen for empirical exploration are justified by their innovative characteristics associated with the absorptive capacity experienced in the company/incubator relationships. We discuss absorptive capacity as a predecessor to product, process, organizational, and marketing

innovations. Data were compiled and processed through content analysis supported by the ATLAS.ti software.

Structurally, in addition to this introduction, this research has a theoretical foundation (“Absorptive capacity and innovation”), methodological aspects, results, and conclusions.

## ABSORPTIVE CAPACITY AND INNOVATION

Organizational knowledge needs to be absorbed and managed through processes that identify, select, organize, share, disseminate, and apply this knowledge in problem-solving, corporate learning, product, and service innovation, developing strategies, and making decisions (Ali et al., 2018). There is the so-called absorptive capacity to motivate these processes, the ability to transfer experiences, information, and perceptions from experts to innovation practices (Ferrerias-Méndez et al., 2016).

As a concept, absorptive capacity (Acap) was coined by Cohen and Levinthal (1990), defined as the firm’s ability to identify, assimilate, and explore knowledge from the environment. The authors argue that the term can be understood as recognizing the value of new information, incorporating it, and directing it for commercial purposes (Cohen & Levinthal, 1990).

Zahra and George (2002) add to the discussion two conceptual dimensions: the Pacap and the Racap, which is the company’s ability to explore and transform the knowledge acquired for the development of new practices; and the first, the ability to develop and assimilate external knowledge, without guaranteeing the exploitation of this knowledge.

According to the proposals developed by Lane et al. (2006), Vega-Jurado et al. (2008), Murovec and Prodan (2009), Flatten et al. (2011), Moré et al. (2014), Ferrerias-Méndez et al. (2016), and Apriliyanti and Alon (2017), organizations should seek mechanisms to develop their absorptive capacity internally. These studies suggest that high absorptive capacity is associated with a better chance of successfully applying new knowledge for commercial purposes, resulting in innovation and good business performance.

One way to understand the innovative process is to know how absorptive capacity occurs and how the company develops routines and procedures to internalize and apply internal and external knowledge innovation (Ávila, 2022; Mura et al., 2013; Wang & Hu, 2020). In this sense, innovation is fundamental to economic growth (Schumpeter, 1997) and the primary source of differentiation and competitive advantage for organizations (Brown, 2008), including in the long term (Buchele et al., 2015).

Defining innovation is broad. It is everything that differentiates and creates value, essential for a good performance, competitiveness, and survival of companies (Zapata-Cantu et al., 2020). It is a process in which knowledge is acquired, shared, and assimilated to create new knowledge that incorporates products and services (Harkema, 2003), methods and procedures (Brewer & Tierney, 2010), and social and environmental contexts (Harrington et al., 2016). According to the *Oslo Manual* (OECD & Eurostat, 2018), innovation refers to implementing a new or significantly improved product (good or service), a process, a new marketing method, or a new organizational method in business practices in the workplace or external relations.

There are different taxonomies of innovation. Classifications related to innovation were emphasized in the studies by Spieth and Lerch (2014), Zhou et al. (2017) and, Yoon et al. (2018), which focused on the organizational learning dimension as an influence on innovation. Other paths include classification as incremental innovation (which builds where it already exists), radical (which produces a total change over the past), or semi-radical, which is located between radical and incremental innovation (Castaneda, 2015; Macedo et al., 2015; Torugsa & Arundel, 2016). However, the classification by Chesbrough (2012), Belso e Diez (2018), Kremer et al. (2019), in closed innovation (internal) or open innovation (external), is based on the origin of the source of innovation.

The OECD (2018), through the *Oslo Manual*, defines four types of innovations that encompass a wide range of changes in the activities of companies: innovations, product innovations, process innovations, organizational innovations, and marketing innovations, which are described in Table 1.

**Table 1**  
*Types of innovation*

| Type of innovation | Subcomponents  |
|--------------------|--|
| Product innovation | Assets<br>Services<br>Knowledge capture and its combinations/applications<br>Product and service design features |
| Process innovation | Production<br>Distribution and logistics<br>Information and communication system                                 |

(continue)

**Table 1 (conclusion)**

*Types of innovation*

| Type of innovation        | Subcomponents   |
|---------------------------|---|
| Organizational innovation | Administration and management<br>Business practices<br>Distribution of responsibilities<br>External relations |
| Marketing innovation      | Marketing, sales, and after-sales support<br>Product positioning and packaging<br>Promotion, prices           |

*Source:* Adapted from OECD and Eurostat (2018).

Product innovation is the introduction of a good or service that is new or significantly improved in terms of its characteristics or intended uses. Process innovation is implementing a new or significantly improved production or distribution method. Marketing innovations are aimed at better meeting the needs of consumers, opening new markets, or repositioning a company’s product in the market to increase sales. Furthermore, organizational innovations in business practices include implementing new methods for organizing routines and procedures for conducting work (OECD & Eurostat, 2018).

Although innovations from developed countries are used as a common source, the Oslo Manual is quite comprehensive and flexible and has become a reference for research in the commercial sector, betting on the usefulness of its content so that companies can enjoy their concepts, adopt them, discuss them or use them as a reference for their innovation initiatives (OECD & Eurostat, 2018).

Finally, innovation is among the main attributes for survival and better business performance. New ventures are aware of this reality, seeking to absorb knowledge and insert disruptive and incremental innovations into the market to reach more customers and achieve remarkable success (Cassol et al., 2017; Rocha et al., 2019). Ventures that increase their involvement in knowledge sources tend to increase their innovative capacity ((Belso & Diez, 2018; Kremer et al., 2019).

Having understood that absorptive capacity is an essential vector for innovation theories and a strong predictor of innovation and knowledge transfer within companies, the next step will be the methodological design used in this study.



## METHODS

Following a qualitative approach, this study, based on the case study strategy according to Yin (2015), with additional support from Lakatos and Marconi (2007), has multiple cases and analyzes the absorptive capacity and the resulting innovation in companies incubated in the Iacoc. This agribusiness incubator aims to offer support to leverage the potential and promote enterprises in the rural environment of the semiarid region of Paraíba.

The choice of cases was made by incubation seniority, considering the minimum incubation time of one year and the estimated time the enterprise manages to adapt its routine to the incubation process. Iacoc coordinators brokered access to the six chosen ventures, including some recently graduated businesses.

Data were collected through semi-structured interviews, whose script was elaborated from the theoretical construction under analysis and validated by three experts, with questions about the genesis of the absorptive capacity and its consequences, the types of innovation, and the processes that interrelate these two phenomena in the studied context. The interview script was composed of two parts, including general knowledge questions about the interviewees, and questions presented from the four previously defined categories that comprise the absorptive capacity performed (Zahra & George, 2002), and product innovations from marketing, process, and organizational (OECD & Eurostat, 2018), together with a pre-analysis of data for the optimal targeting of collection.

The corpus built had six interviewees (E1, E2, E3, E4, E5, and E6), who authorized the disclosure of their names, chosen from their performance in the enterprises and general knowledge about the processes existing in them. For the composition of the primary data, document analysis was carried out, made possible by the incubator and the companies, and specific interactions with the respondents during the data analysis phase to clarify various aspects. Data from the interviews are described in Table 2.

Given the context of the Covid-19 pandemic, the interviews took place through virtual platforms, mediated by tools such as Skype, Zoom, and Google Meet, in December 2020. Then the interviews were transcribed and analyzed, being the most relevant source of data for the study. The analysis of documents was carried out to complement the understanding and guide the search for information about the company within the scope of this study through websites, technical reports, brochures, various newsletters, and other institutional documents.

**Table 2**  
*Interview data*

| Identification | Occupation     | Enterprise   | Number of associates/cooperatives | City                             | Time     |
|----------------|----------------|--|-----------------------------------|----------------------------------|----------|
| E1             | Vice-president | Rufinos – Produtos Artesanais  | 15                                | Pombal/PB                        | 00:30:41 |
| E2             | President      | Picuí Polpas – Cooperativa Agroindustrial do Seridó e Curimataú Paraibano (COOASC) | 12                                | Picuí/PB                         | 00:34:28 |
| E3             | President      | Padaria Bolo das Oliveiras   | 16                                | Várzea Comprida das Oliveiras/PB | 00:43:51 |
| E4             | President      | EmanaMel – Mel, Polpa de Frutas e Bolos  | 38                                | São Bentinho/PB                  | 00:51:08 |
| E5             | Manager        | Associação dos Apicultores do Sertão Paraibano – Aspa                              | 33                                | Aparecida/PB                     | 01:06:37 |
| E6             | Vice-president | Fonte de Sabor   | 15                                | Pombal/PB                        | 01:24:22 |

*Source:* Elaborated by the authors.

As for data analysis, content analysis was performed following the paths of Bardin (2011), which consists of three stages of material analysis: 1. pre-analysis; 2. exploration of the material; and 3. treatment of results, inference, and interpretation. We also registered the option of a support tool: the ATLAS.ti software, which, due to its flexibility, significantly contributes to qualitative analysis, ensuring greater systematicity of data, structuring them to help organize the analysis categories and form the networks that are associations where existing connections between coded information can be visualized (Sampieri et al., 2014). The numbering appears next to the citations (coded in the analysis). Respondents authorized the disclosure of names in the survey results. The letters G correspond to the number of references to the code referred to in citation networks. The letter D refers to density and does not imply analysis.

## RESULTS AND DISCUSSION

The Iacoc, linked to the PaqTcPB and the Peasa, work to strengthen the sector agriculture through actions to encourage the development of productive agribusiness ventures in the semiarid region of Paraíba. Iacoc received the certification 1 of Brazilian Reference Center for Support to New Enterprises (Cerne), a methodology developed in partnership with Brazilian Support Service for Micro and Small Enterprises (Sebrae) and National

Association of Entities Promoting Innovative Enterprises (Anprotec), to create a platform for solutions to expand the incubator’s capacity to generate successful innovative ventures.

Next, each category of analysis based on absorptive capacity and the effects on each type of innovation are discussed.

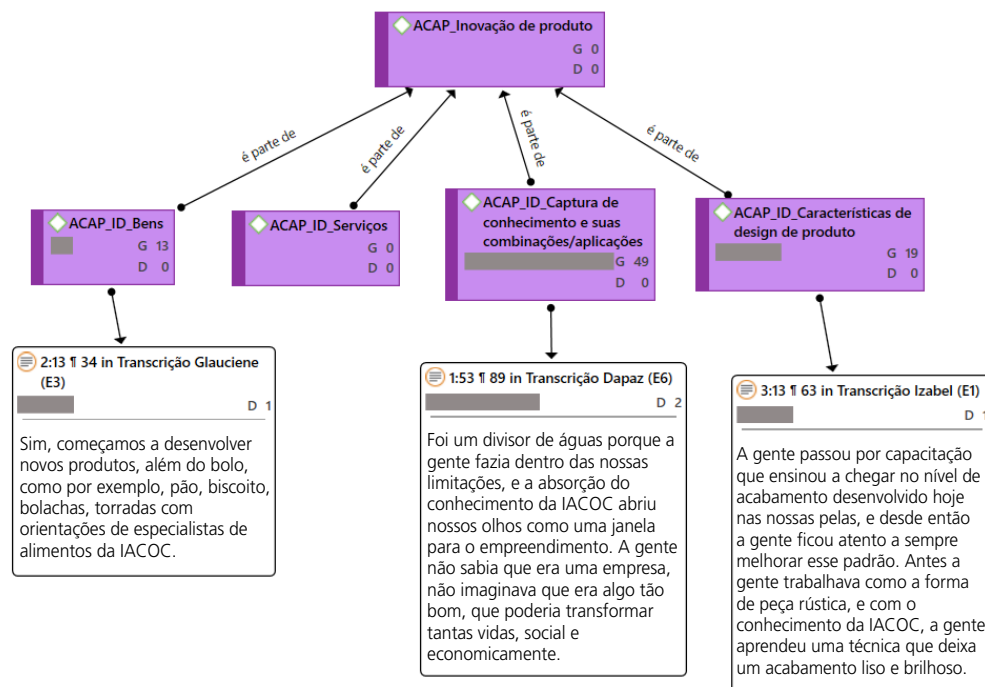
## Absorptive capacity and product innovations category

This category refers to the absorptive capacity and product innovations comprising the subcomponents: goods, services, knowledge capture, and their combinations/applications and product design characteristics (OECD & Eurostat, 2018).

We started the analysis of the product innovation absorbency category with the breakdown of the interviewees’ statements in accordance with the subcomponents of the types of innovation (OECD & Eurostat, 2018), whose citations are displayed in Figure 1. The statements demonstrated aspects that confirm the elements present in the Oslo manual.

**Figure 1**

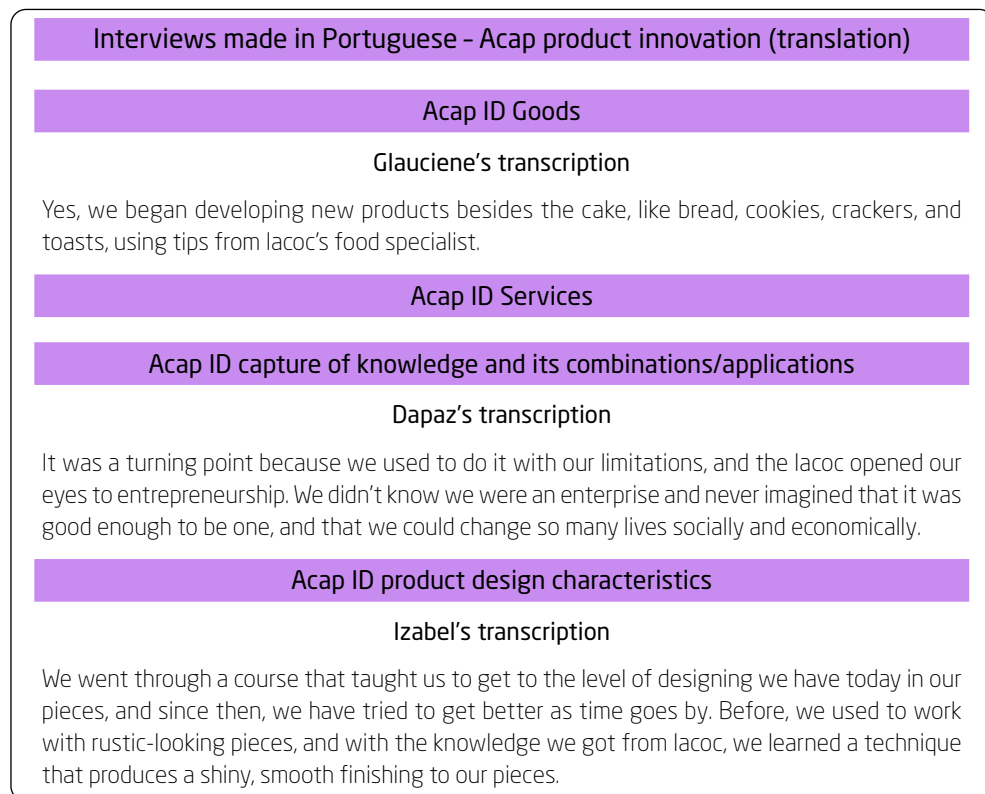
### Absorption capacity and product innovation category



(continue)

## Figure 1 (conclusion)

### Absorption capacity and product innovation category



*Source:* Elaborated by the authors using the ATLAS.ti software (2021).

Absorptive capacity is a driver for taking advantage of the knowledge and application in innovations (McCann & Folta, 2018). In this sense, we highlight the absorptive capacity realized (Zahra & George, 2002) of incubated enterprises to transform the resources/knowledge assimilated at Iacoc, resulting in product innovation by introducing a new good that significantly differs from previous products or processes (OECD & Eurostat, 2018). The interviewees report this fact: "At first, we only produced honey, and just when the group became incubated at Iacoc, it started to produce cake and fruit pulp" (E4); "As we manufacture pans, they suggested making thermal gloves to add value to the piece" (E1).

We innovated our product because in the beginning we worked with a recipe and we did not take into account the values of all the ingre-

dients, if there was a waste, or if our cake, for example, was too big and poorly made, ugly visually, so we reduced it and standardized the format (E4).

It is noteworthy that product innovation introduces a good or service (OECD & Eurostat, 2018). The Services subcategory provided in the *Oslo Manual* does not apply to the researched context. There were no elements evidenced in the services subcategory due to the type of activity performed by the incubated enterprises. They were not found in the contexts under analysis, service providers, or intangibles. The research incubated businesses offer tangible goods, materialized during their production process, and whose ownership is transferred to the buyer.

The capture of knowledge and its applications occur with enterprises' absorptive capacity to transfer experiences, information, and perceptions from specialists to innovation practices (Ferrerias-Méndez et al., 2016). In the entrepreneurs' speeches, this is evidenced (Figure 1) mainly in the mentions of the promotion of personal and local development and the advancement of business development, generating a better quality of life for the rural environment of the semiarid region of Paraíba. All demonstrate that they capture knowledge and transform it into innovation, enhancing the social and economic environment and the transformation of enterprises.

In this sense, the absorptive capacity realized by the incubated ones constitutes the company's capacity to explore and transform the acquired knowledge to develop new personal and professional practices. The following excerpts describe the interviewees' feelings:

Iacoc is a partner who lends a hand, and it teaches how to grow as a dignified human being and as an enterprise (E4).

So, only after the knowledge acquired at Iacoc did we learn to have confidence in ourselves, and it was transforming to know that we were capable of producing a good product (E4).

Today we feel very victorious, despite the difficulties, we learned a lot at Iacoc and applied it every day, which makes all the difference for our enterprise (E2).

As for the product design characteristics, we observe the absorptive capacity and the resulting innovation in changes in the form and appearance of the enterprises' product, comprising substantial changes in the product



design, resulting in innovation regarding its characteristics (OECD & Eurostat, 2018). This fact is reported by respondent E4:

Another thing that we learned and applied after Iacoc is that, before, we only made 500g pulp, and we learned how to make it in small packages of 100ml and thus serve other audiences. Regarding honey, before Iacoc, we only worked with liquid honey; now, we work with honey in combs, which are more profitable because it adds more value. Moreover, about the cakes, we only worked with large, deformed cakes, and we learned how to produce and standardize small cakes with a visually better shape.

Therefore, in this type of innovation, in the ventures incubated at Iacoc, there is the presence of the absorptive capacity carried out and three sub-components provided for by the *Oslo Manual* (OECD & Eurostat, 2018), articulated in various elements, from the appearance of a new good to significant changes of its characteristics. Thus, we observe that entrepreneurs reinforced absorptive capacity and its relationship with innovation, focusing on the organizational learning dimension, stating that applied knowledge influences innovation (Spieth & Lerch, 2014; Yoon et al., 2018; Zhou et al., 2017).

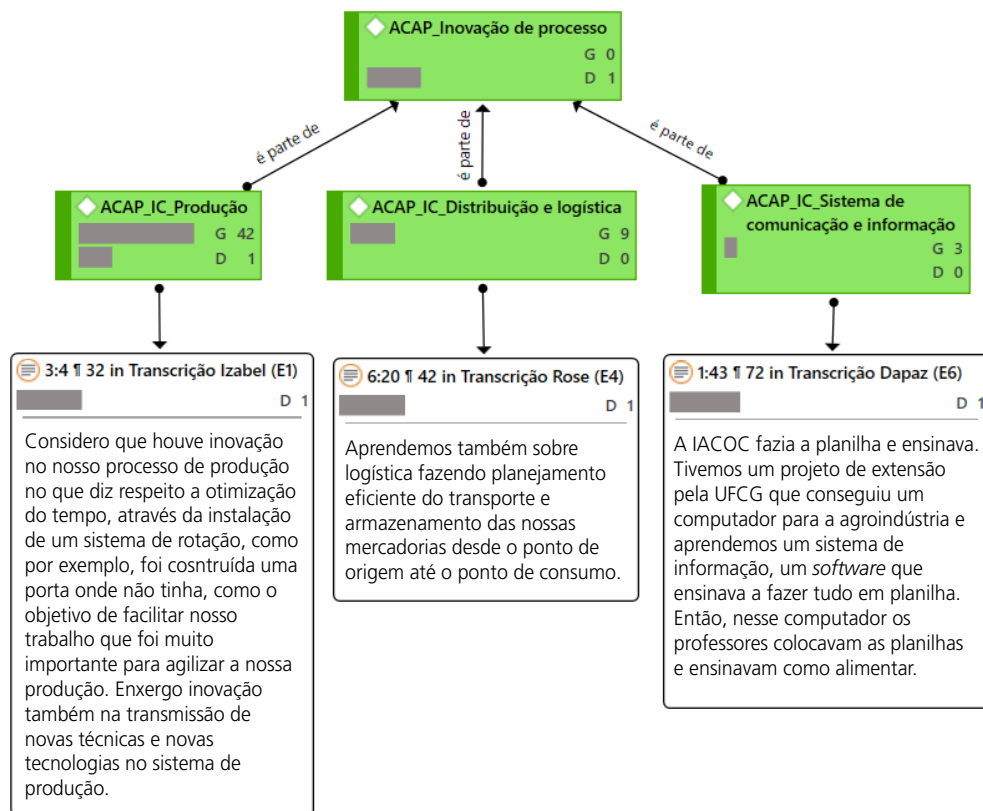
Regarding product innovation, which is the most visible type of innovation, agribusiness-derived products undergo significant changes in their manufacturing, packaging, and distribution processes, adding more excellent value and incorporating innovation through the technicality that comes from the absorption of knowledge from the incubator.

## **Absorptive capacity and process innovation category**

The absorptive capacity and process innovations were explored in this category, comprising the subcomponents: production, distribution and logistics, and communication and information system (OECD & Eurostat, 2018). The related elements are arranged in the figure below.



**Figure 2**  
*Absorptive capacity and process innovation category*



**Interviews made in Portuguese - Acap process innovation (translation)**

**Acap IC production**

**Izabel's transcription**

I consider that there was an innovation of our products concerning the optimization of time, through the installation of a rotation system, for example, the construction of a door where there wasn't one, aiming to facilitate our work, which was very important to make production more agile. I also see innovation in transmitting new techniques in the production system.

**Acap IC distribution and logistics**

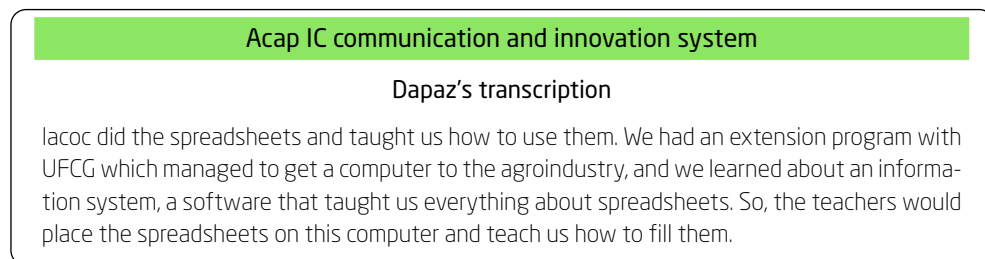
**Rose's transcription**

We also learned about logistics by efficiently planning the transportation and stocking of our products from the first point to the consumer.

(continue)

## Figure 2 (conclusion)

### *Absorptive capacity and process innovation category*



*Source:* Elaborated by the authors using the ATLAS.ti software (2021).

Following the process innovation concerning production (OECD & Eurostat, 2018), the enterprises implemented through the absorptive capacity realized (Zahra & George, 2002) a new or significantly improved production or distribution method. The absorptive capacity and resulting in process innovations in the projects encompassed significant changes in new or substantially improved techniques, equipment, and software in auxiliary support activities, such as purchasing and accounting (OECD & Eurostat, 2018), as reported:

I see Iacoc as a way to improve and innovate. It brought us innovation in various segments; starting with professional training, knowledge of cash control, inventory, division of tasks, and standardization, we rediscovered our production and expansion capacity innovation of our business. I can assure you that there was a remarkable transformation and all of them contributed positively to our business development (E1).

From the absorption of resources/knowledge, the incubated enterprises implemented new production methods to reduce material and time waste. It is possible to see that production has been significantly improved for incubated companies (OECD & Eurostat, 2018). In some businesses, the control of the processing of fruit pulps began with guidance from nutritionists. For others, the implementation of standardization in their productions.

In the bakery, the cake was made at home. Each member of the association had a recipe. From the absorptive capacity, a change occurred that resulted in adherence to standardization, and the elimination of unnecessary and inappropriate ingredients through the guidance of a food specialist,



generating pasta yield and improving flavor and quality. These innovations were incorporated with difficulty for some businesses due to the entrenchment of customs and practices. As one of the entrepreneurs describes:

It was a change in the production method. Furthermore, it is not easy to convince a group of people and show all the procedures needed if you do not have someone's help to have the training, qualification, and experience. For example, changing the recipe, because people have the culture that the milk cake needs certain products, it is not easy to change this mentality and show that you don't need all those ingredients. It is a tremendous job, if you do not have support to take your hand and show you the right path, it is difficult, and that was the support we felt from Iacoc and UFCG (E3).

Also, in this sense of process innovations in production, it is possible to mention the example of one of the projects in an area with high solar incidence, which introduced changes in techniques and equipment in the activities. We implemented a project by Iacoc with experts from the agronomy course at UFCG and the Semiarid Renewable Energy Committee (Cersa). The goal was to adopt the on-grid photovoltaic system, which consisted of equipment to convert solar energy into electricity, which started to supply the business energetically. Today, it works 100% with solar energy. In addition to starting during incubation, the reuse of water and installing a biodigester to transform the rest of the food and animal feces into natural gas. "Iacoc contributed to this issue of the use of natural resources, and we started to understand how important sustainability is for the environment and our financial economy" (E3).

In this context, we observe that incubated ventures become innovative companies characterized as companies that, during a given period analyzed, develop innovative strategies, create products, and improve processes or a combination of them (OECD & Eurostat, 2018). Furthermore, the pulp industry, during incubation, had a 70% growth in production and sales through the transformation of knowledge into innovative production methods. However, we can demonstrate the support of UFCG for innovation in the production of hatched ones, as one of the entrepreneurs points out:

Honey needs to be tracked, with lots, cities, it needs all the control required by the Ministry of Agriculture. Iacoc fully encourages this quality control from the beginning of production. From the laboratory



part, because the honey leaves the field, a sampling of the honey is taken, which is sent to the laboratory. For that, we have the support of the UFCG (E5).

Regarding innovativeness in terms of distribution and logistics, we observed in the interviewees' speeches a lack of knowledge about the importance of distribution logistics, whose activity is focused on planning the storage, circulation, and distribution of products to the final customer. One of the entrepreneurs succinctly describes: "We were talking about production, but without even knowing what logistics is, so we learned to control the stock properly, take care of storage and organize transport to meet delivery deadlines" (E2).

In the field of communication and information systems, the implementation of new or significantly improved information and communication technologies is considered a process innovation if it aims to improve the efficiency or quality of activity through the hardware functions, software, telecommunications, and automation, facilitating business processes (OECD & Eurostat, 2018). In the words of entrepreneurs, this subcategory is less robust. Therefore, this type of process innovation, computer-aided implementation, is a resource/knowledge that is less absorbed and transformed by the incubated enterprises. However, it reflects innovation to a greater or lesser degree while presenting substantial improvement in processes when absorbed.

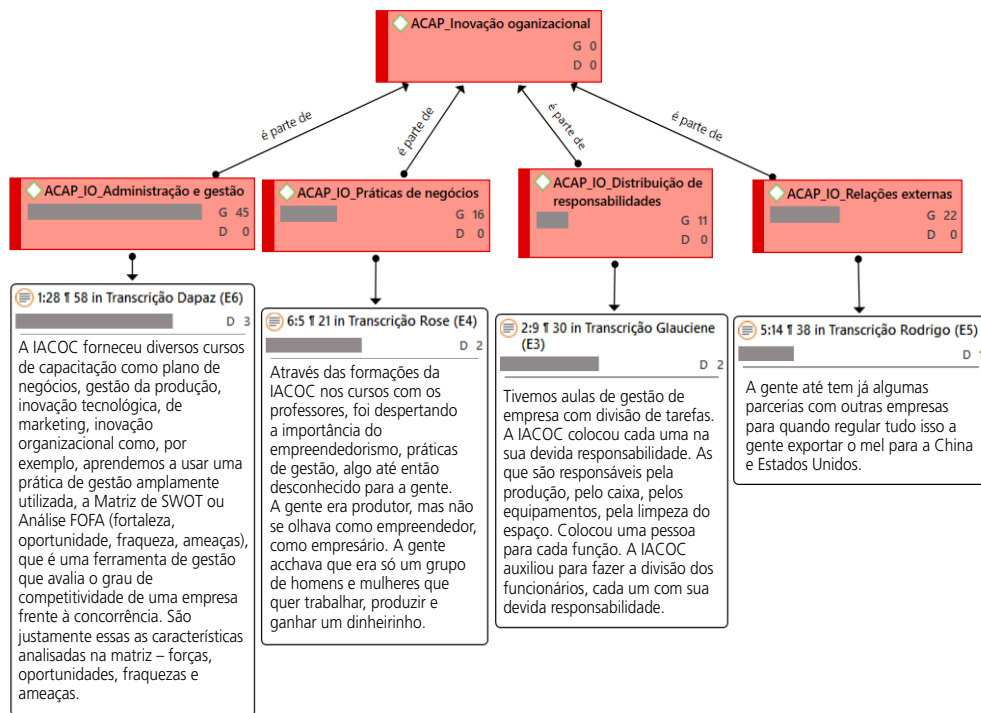
## **Absorptive capacity and organizational innovation category**

This category presents the absorptive capacity and organizational innovations and their subcategories: administration and management, business practices, distribution of responsibilities, and external relations. Organizational innovation is implementing a new organizational method in the company's business practices, its workplace, or its external relations (OECD & Eurostat, 2018).

We started the category analysis by breaking down the interviewees' statements in agreement with the subcomponents, whose citations are displayed in Figure 3. The statements showed aspects that confirm the elements present in the *Oslo Manual*.



**Figure 3**  
**Absorptive capacity and organizational innovation category**



**Interviews made in Portuguese - Acap organizational innovation (translation)**

**Acap IO administration and management**

**Dapaz’s transcription**

Iacoc provided many courses like business planning, production management, technological innovation, marketing, and organizational innovation. We learned how to use a management practice that is widely used, the SWOT model (strengths, weaknesses, opportunities, and threats) which is a management tool that evaluates the degree of competitiveness of a company in comparison to its competitors. These are precisely the characteristics that are analyzed in the Model.

**Acap IO business practices**

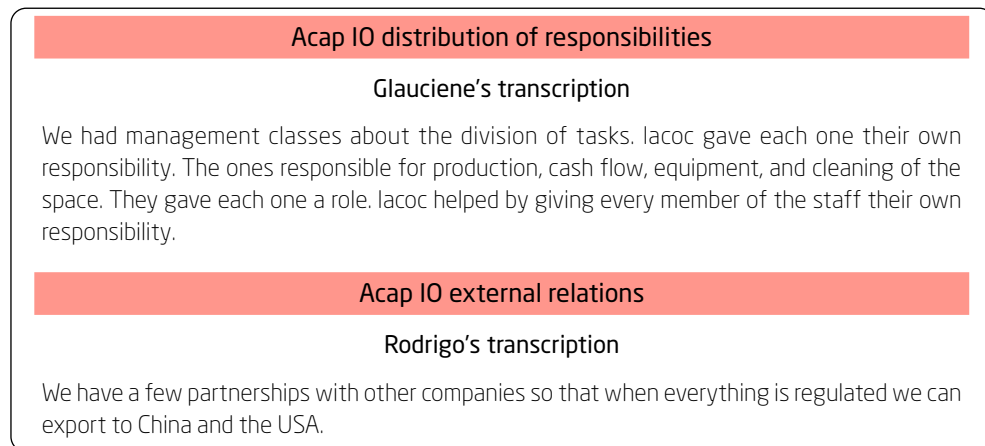
**Rose’s transcription**

Through Iacoc’s courses, with the teachers, we were awakened to the importance of entrepreneurship, and management practices, things that were unknown to us until then. We were producers, we didn’t see ourselves as entrepreneurs or business people. We thought we were just a group of men and women who wanted to work, produce, and make a little money.

(continue)

### Figure 3 (conclusion)

#### *Acap IO distribution of responsibilities and organizational innovation category*



*Source:* Elaborated by the authors using the ATLAS.ti software (2021).

In the scenario of the incubated enterprises under analysis, we understand that management knowledge and business practices were practically non-existent. They had a limited view of their management, having commercialization as their primary objective. Respondents did not perform the activities as a set of actions necessary to manage an organization in all its areas, promoting integration between them and the best use of available resources to achieve the planned objectives.

In this sense, the enterprises highlighted that they learned management and entrepreneurship from the incubation. They reported that their activities improved significantly as several positive changes in the administrative routine (OECD & Eurostat, 2018). As evidenced by the interviewees' statements:

Another thing, we were terrified of facing innovation, scared of innovating in general, and afraid of not working out. Nevertheless, with the training, we see that we can innovate, and we are introducing new products to our internal management. We are growing precisely because we have this knowledge. After all, if not, we were stagnant, stopped. As I said, we learned to acquire more confidence in managing our business through Iacoc (E4).

Iacoc showed the importance of good business practices with five senses. And we applied this quality tool, the 5S, which allowed for a reduction in waste and better use of time. We had no management organization, which made the difference (E5).

Regarding absorptive capacity and organizational innovations in terms of distribution of responsibilities, we observed innovations in associations and cooperatives during incubation, in the organization of the workplace involving the implementation of new methods to distribute responsibilities and decision-making power among employees in the division of existing work within the company's activities (OECD & Eurostat, 2018). As the respondent E4 reinforces:

If it weren't for Iacoc, we wouldn't have direction; we wouldn't have evolved in several aspects, such as the issue of product costs, an organization within the company's management, because we worked like that, everything was very disorganized. There was no division of work; heavy work was left to some and not others.

As for absorptive capacity and organizational innovation concerning external relations, entrepreneurs highlighted that they acquired previously limited access to the market. They also stressed that before incubation, they did not have partners, and therefore the application of acquired knowledge promoted the possibility of expanding their market share. As reported by the respondent:

We entered a partnership with the Cooperative of Rural Producers of Family Farming during the incubation period on the Coast of Sul Paraibano – Coopasa. We started our story within Iacoc because no one knew anyone, and we already left there doing business; we still have partnerships today. So, the main contributions to external relations innovations were partnerships with trade, partnerships with other cooperatives, and market access (E2).

It is possible to observe that incubated entrepreneurs in the food areas served only the public of schools – Food Acquisition Program (PAA) and National School Feeding Program (PNAE) –, focusing on associations/cooperatives, sales, directed to these programs and to the community.



However, as the application of knowledge changed the practices of companies, they reached other consumers, such as supermarkets, cafeterias, and gyms.

We noticed organizational innovation practices in external relations by implementing new organizational methods, such as changes in practices in the company's external relations (OECD & Eurostat, 2018), by encouraging incubated enterprises to identify all regions of potential customers, for potential buyers, to export. The interviewees corroborate:

Iacoc takes away that prejudice that we sometimes have of thinking small and encourages thinking about something big, with capacity even for export (E5).

PNAE is good, but we cannot depend on just one market. [...] It's a crucial point in incubation, reaching and guaranteeing new markets, making new external relations (E6).

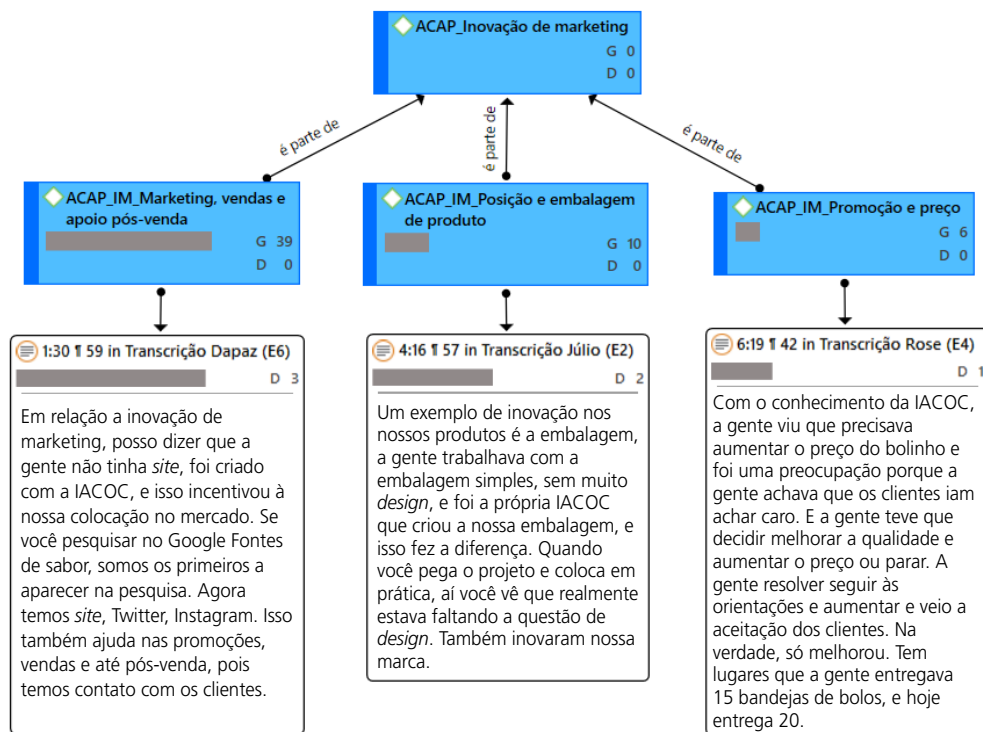
Given the evidence, there is absorptive capacity in incubated enterprises, understood as the ability to recognize the value of new information, assimilate it and direct it to commercial purposes and, as support for the construction of competitive advantage based on innovation (Cohen & Levinthal, 1990; Zahra & George, 2002). We observe, then, that all the knowledge captured and absorbed influences changes in management practices and, consequently, triggers organizational innovations and consequent restructuring in all sectors of the incubated companies.

## **Absorptive capacity and marketing innovation category**

This category refers to absorptive capacity and marketing innovations comprising the subcomponents: marketing, sales, after-sales support, product placement, packaging, promotion, and pricing. It involves implementing a new marketing method with significant changes in packaging, product positioning, advertising, or pricing of new sales channels (OECD & Eurostat, 2018). The related elements are arranged in the Figure 4.



**Figure 4**  
*Absorptive capacity and marketing innovation category*



**Interviews made in Portuguese - Acap marketing innovation (translation)**

**Acap IM marketing, sales, and post-sales support**

**Dapaz’s transcription**

Concerning marketing innovation, I can say we didn’t have a website, it was created with Iacoc, which motivated our ranking in the market. If you Google Fontes de Sabor, we are the first ones to appear. We now have a website, Twitter, and Instagram, which helps with promotions, sales, and even post-sales because we have direct contact with our customers.

**Acap IM positioning and product packaging**

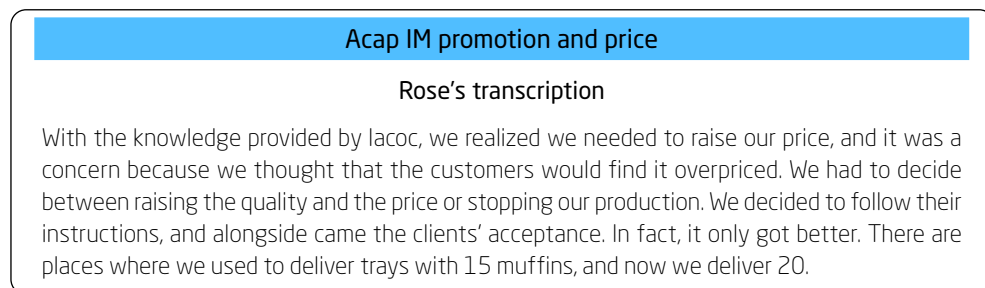
**Julio’s transcription**

An example of innovation in our products is the packaging. We used to work with simple packaging, not a lot of design, and it was Iacoc themselves who created our new package, which made a huge difference. When you get a project and you put it into practice, then you can see that it was really missing the design factor. They also innovated our brand.

(continue)

## Figure 4 (conclusion)

### *Absorptive capacity and marketing innovation category*



*Source:* Elaborated by the authors using the ATLAS.ti software (2021).

Exploring this group, in terms of marketing, sales, and after-sales, we noticed in the unanimous speech of the entrepreneurs the mention of the creation and dissemination of the brand and the consequent learning and enhancement of after-sales. Although the businesses have different activities, we observed a significant alignment in the speech of those interviewed about the marketing plan as the main innovative result.

This example of knowledge absorption and application in marketing innovation common to all enterprises highlights that, although other elements can lead to different innovative performances, absorptive capacity can be an important driver to understanding the differences in asymmetrical use of knowledge, as well as its application in innovations (McCann & Folta, 2018). The results of other forms of innovation: product innovation, process innovation, and organizational innovations (OECD & Eurostat, 2018), vary according to the distinctive aspects and the absorptive capacity of each company.

All interviewees reported that before incubation, they did not have a visual identity, such as labels, promotional material, and website: “[...] we did not have any action aimed at the dissemination of our products, everything came from the knowledge acquired by Iacoc. We started to have a visual identity at Iacoc” (E1). In line with the company’s ability to explore and transform the knowledge acquired to develop new practices (Zahra & George, 2002), they described that after the creation and dissemination of the brand, they showed an increase in product acceptance and recognition by consumers. They demonstrated that the incubator’s commercialization, formalization, and organization aspects provided visibility for the business. As the respondents corroborate:



Yes, before Iacoc, we didn't have a brand; we only sold door-to-door here in the municipality of Pombal; after incubation, it started in the Catolé region. Today we sell to Catolé, São Bento, Brejo, Belém de Brejo, Jericho, Lagoa, Bom Sucesso, Brejo do Cruz, Brejo do Santo. Before, we only sold here in Pombal. We won 3 Sebrae Awards; we went to represent the state of Paraíba in Brasília, and we went out to Small Companies, Large Businesses, representing the Northeast, and this boosted the excellent placement of our product in the market (E6).

After Iacoc, today we sell to the entire community, which is a vast community; we have around 80 families, with aggregated small communities. We deal in the community three days a week, we sell for school lunches, both to the PAA and the PNAE, we have already placed some of the cookies in the city's supermarkets, and we are also selling to the of São Domingos, a neighboring town. We already put it on in the open market, but due to the pandemic, we are not going. But in the incubation process, we reach new markets (E3).

As for the absorptive capacity of marketing innovation in terms of packaging, promotion, and prices, the following were highlighted:

I remember a fair where the general coordinator of Iacoc was with us, and we were selling honey for R\$12.00 a comb, and she said it was to sell for R\$15.00 because everything we were using in the production process was quality, the jar, the label (E4).

There was also the issue of the new label inserted in our products that gave more visibility, so we can compete equally in terms of packaging and price, as we see in the market (E2).

Furthermore, interviewed entrepreneurs reported that they achieved, during incubation, the seal of the Federal Inspection Service (SIF), adhered to good manufacturing practices, standards, and differentiated packaging with nutritional labeling. We observed that they applied their knowledge to innovation in placement on the market by becoming adept at social media, such as a website, Instagram, and Facebook, and carrying out promotions and applying the fair price of products.

Finally, we understand knowledge absorption as transferring experience and knowledge to innovative business processes (Oyemomi et al., 2016). This concept is directly reflected in the post-incubation relationship between

incubated companies and their customers, which is now managed with more assertiveness, planning, and control, given the knowledge absorbed and an innovative attitude towards the market.

After explaining the results obtained through the analysis, the following topic will bring together the main conclusions found in the research.

## Discussion

Associations/cooperatives continually seek mechanisms to develop their absorptive capacities, applying knowledge from external sources, adapting them to their internal needs, and seeking new or better results in products and processes. In this sense, there is a notable absorptive capacity carried out by enterprises in the rural area of the semiarid region of Paraíba, and, as a result, a set of innovative practices were adopted.

In Paraíba, the work developed by the incubator is aimed at low-income communities in situations of social vulnerability, generating the possibility of marketing groups to transform themselves into associations, cooperatives, and micro-enterprises and promoting inclusion and community development. In this scenario, companies incubated by Iacoc are formed by micro and small companies dedicated to agribusiness, whose activities fall into any of the following areas: Crop production, horticulture, and floriculture, production of certified seeds and seedlings, livestock, fishing, aquaculture, bee-keeping, alternative poultry farming, food product manufacturing, crafts, and beverage production.

In this context, the appropriation of knowledge is naturally asymmetric. However, entrepreneurs capture expertise and transform it into innovation, resulting in enhancing the social and economic environment and the transformation of professionals. In this sense, the incubator has enabled significant changes in business dynamics and the incubated companies' social context (see Table 3).

**Table 3**

*Findings on the connection between absorptive capacity and innovation*

| Type of innovation | Participants' perception of absorptive capacity and innovation  |
|--------------------|---|
| Product innovation | The products are improved in the manufacturing, packaging, and distribution processes, innovating by absorbing the incubator's knowledge. |

*(continue)*

**Table 3 (conclusion)**

*Findings on the connection between absorptive capacity and innovation*

| Type of innovation        | Participants' perception of absorptive capacity and innovation   |
|---------------------------|--|
| Process innovation        | Although scarcer, computer-aided implementation is an absorbed resource/knowledge and reflects innovation in processes.  |
| Organizational innovation | Knowledge is absorbed and influences management practices and organizational innovations and consequent restructuring in all sectors of incubated companies.   |
| Marketing innovation      | Post-incubation relationship between incubated companies and their customers: relationship with more assertiveness, planning, and control, given the absorbed knowledge and an innovative attitude towards the market. |

*Source:* Elaborated by the authors.

The categories' elements reflect the literature in the fields of absorptive capacity and innovation. The absorptive capacity and product innovations category, for example, translates into the introduction of a new good that differs significantly from previous products. In the process innovation category, we noticed significant changes in techniques, equipment in auxiliary activities, and the organizational innovation category, which brings to the involved projects a new organizational method that involves the company's business practices, organization of its workplace, or the workplace itself, and its external relations. Finally, the marketing innovation category supports the direction of resource-absorbing incubators to meet the needs of consumers. In this sense, all types of foreseen innovation are found in the contexts under analysis.

## FINAL CONSIDERATIONS

This article analyzed companies' absorptive capacity and innovation actions incubated in the Iacoc. This study presented a theoretical contribution from the approximation of the literary basis between absorptive capacity and innovation results in the context of incubated enterprises through the innovation classification provided for in the *Oslo Manual* (OECD & Eurostat, 2018), opening a new path for field studies.

As a managerial contribution, we present practices of incubated enterprises that can inspire management models for innovations in other contexts

and other organizations that wish to develop absorptive capacity by applying them in innovative processes. Limitations faced in this construction include: the lack of access to other entrepreneurs due to the Covid-19 pandemic and the online interviews. We suggest that future studies carry out empirical explorations with comparisons between incubated and non-incubated ventures from different segments and contexts and quantitative analyses that add subsidies for measuring results about the absorptive capacity of those resulting in innovations.

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