Proposition of an Innovation Center in Santa Rosa, RS, Brazil, by means of the Via Cycle Methodology

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Abstract

A successful Innovation Center (IC) needs to be closely related to the territory in which it is inserted and have its functions aligned with regional development, the supply of facilities, services and resources and the promotion of culture and the innovation and entrepreneurship connection. This study aimed to develop stages of recognition and mapping of elements that underlie the implementation of an IC in the city of Santa Rosa, state of Rio Grande do Sul, Brazil, among them the challenges related to innovation faced in the city; the personas and actors involved; the identification of solutions; the potential stakeholders partners; the proposition of an action plan; and the presentation of this plan to those involved in the process. National and international ICs were analyzed as references for the study, the main ICs of Rio Grande do Sul, the state where Santa Rosa is located were mapped, and the innovation pathway of the city was addressed. Using the Via Cycle Methodology, the interactions between the actors and stakeholders that deal with innovation were studied, the challenges faced were identified, and a solution was proposed to face the perceived challenges. For this result, strategies capable of encompassing the various actors mapped and involved in the structuring pillars of the territory (education, governance, public power, and culture) were suggested, with the intention of proposing the implementation of the IC. The breakdown of these pillars into detailed actions resulted in a significant educational, social, cultural, and economic potential, whose details can serve as references to boost innovation-oriented experiences, meet technological needs, and strengthen various dimensions.

Keywords: Via Cycle Methodology; Innovation Center; Innovation; Entrepreneurial Culture.

1. Introduction

In a general context, the 20th century was based on the industrial economy, which had as a milestone the development of energy sources and raw materials on the global development agenda. Currently, the pillar of the 21st century economy is based on talent and technology, that is, on knowledge (PIQUÉ, 2017). In this sense, it stands out the possibility of being created conditions aimed at the generation of knowledge, regarding the development of talent and technologies in various existing places. The intention is based on expanding and innovating installed capacities and developing entrepreneurial potentials, generating conditions to boost this new economy.

From these efforts, several terminologies have emerged from the areas of innovation and entrepreneurship, close together in their objective to promote the exchange of information, the sharing of knowledge, and the adequacy of the terms in force in the technological-business-scientific community**.** Among the different existing terminologies is the Innovation Center (IC) typology. According to Abdala *et al*. (2016), an IC corresponds to a physical community, which has as subsidies the promotion and use of public policies, services, mentoring and consulting, and articulates activities between research and commercialization, enabling the success of ideas and companies that would be unlikely outside of it.

The emergence of the ICs occurred in Germany, approximately in the 1980s, with the intention of both promoting innovation in different economic and scientific environments and to disseminate and integrate small businesses outside the industries established at the time (NOOTEBOOM; COEHOORN; VAN DER ZWAAN, 1992). In this perspective, it is identified in the characteristics of the ICs a movement of awareness and practices of the actors involved, among them: universities, companies and government.

According to Teixeira and Ferreira (2020), the ICs act as driving forces for innovation, playing an important role in regional development. Through the valorization of ideas, the creation of new business ventures, and

the implementation of new processes and projects in partnerships, they contribute to local economic regeneration and help in industrial exploration. In this sense, there are attributes and functions peculiar to ICs, such as the following: regional development; development of innovations through business; provision of shared facilities, services, and resources; and promotion of the culture and connection of innovation and entrepreneurship.

The knowledge developed in an IC is focused on the culture of innovation and entrepreneurship, especially for the development, prototyping, production, and boosting the commercialization of technological services, processes, and products, focusing on the intellectual capital of the region (TEIXEIRA; MATOS, 2018). Given the economic context presented and the characteristics and role of an IC, it is observed that understanding how the dynamics of a region occurs, with respect to innovation, is important to generate propositions that enable the development of new knowledge.

Given the above, the study question is what are the favorable and challenging aspects for the implementation of an IC in Santa Rosa, a municipality located in the state of Rio Grande do Sul, Southern Region of Brazil. Therefore, the objective of this research was to develop stages of recognition and mapping of elements that underlie the implementation of an IC in Santa Rosa, including: the challenges related to innovation faced in the municipality; the personas and actors involved; the identification of solutions; the potential stakeholders partners; the proposition of an action plan; and the presentation of this plan to those involved in the process. The Via Cycle Methodology was used to accomplish it.

2. Innovation Center as a reference

In view of the objective of this study, we sought to analyze the performance of experiences of ICs already constituted, at international and national levels. The focus was on understanding consolidated experiences in society, especially in the area of education, which could serve as inspiration and contribute to the construction of the proposal for the implantation of a CI in the analyzed region, since they generate the possibility of reflections and points of attention. Among the inspiring cases are the following:

The IC named as "*Mova– Centro de Innovación del Maestro*" is located near the University of Medellín, in the District of Science, Technology and Innovation, in the northern part of the city of Medellín, Colombia. Since 2014, it has been developed through the Secretariat of Education and with resources from the *Medellín, City for Life Fund*, in a covenant between the association, *Explora Park* and *Proantioquia*, as strategic allies (MARÍN; GARRIDO; ORTIZ, 2015). It is a platform for teachers to conduct educational research and experiments and obtain training on a wide range of topics. The space covers 5,000 m², has laboratories, auditoriums, sports courts, and classrooms, and offers an environment for teachers to meet and work on new and innovative teaching methods.

According to Marín, Garrido, and Ortiz (2015), the theme of educational innovation in that IC is represented as the way to articulate the plurality of views on education and contribute to their materiality, according to the specific characteristics of each circumstance. To this end, Mova states that educational innovation occurs when a pedagogical practice meets three criteria: practice situated in the context of a particular group; practice that transforms the group's educational experiences; and practice that permeates the educational experiences of other groups.

Another IC analyzed was the "*Inova - Agência de Inovação da UNICAMP*", located in the state of São Paulo, Brazil. The State University of Campinas (UNICAMP) maintains Inova as a patent center that operates on three fronts: institutional communication; intellectual property; and partnerships with the private sector. With Inova, starting from institutional communication, through events, lectures, and contests, the university expands the entrepreneurial culture. In this sense, the center manages 600

companies, which employ about 30 thousand people (SECRETARIA DE INOVAÇÃO, CIÊNCIA E TECNOLOGIA, 2020).

Regarding intellectual property, part of the university's remuneration comes from the licensing of domestic production. The amount is invested in the construction and improvement of laboratories. Although such resources exist, innovation in research derives from funding agencies or partnerships with industry. In addition, the university grants scholarships for teachers, researchers, civil servants, and students, in order to develop activities directly linked to fostering innovation within its projects (INOVA - UNICAMP, 2020). The granting of scholarships was provided for in the Legal Framework of Innovation, at the state level in 2017 and at the federal level in 2018, and in the UNICAMP Innovation Policy of 2019, approved by the University Council.

Through the analysis of inspiring national and international cases, it was possible to verify how different elements that make up the characterization of an IC are put into practice, specifically in relation to those presented, which are related to Educational Institutions. From this, we sought to narrow this understanding about the performance of ICs, taking into account players that are closer to the territory under consideration, that is, the city of Santa Rosa

2.1 Reference Innovation Centers in the state of Rio Grande do Sul

The connection of the scientific and market spheres impacts the success of innovation, considering the transformation of knowledge into product, and adapting to market demands. In this context, the state of Rio Grande do Sul is the second Brazilian state in scientific capacity concerning the development of innovation systems, which corresponds to the number of articles published in technological journals per capita and the scientific impact of the universities located in the state.

Related to this, the state is concentrating efforts and investments so that by the year 2030 it will become a global reference in innovation as a local development strategy, through the realization of the state program *INOVA RS*. Based on and inspired by experiences in Brazil and around the world, this program was created by people motivated to put the state on the global innovation map. Among the actions of this program, the draft of the State Innovation Law (*Lei Gaúcha de Inovação - LGI*) stands out, which was submitted to the State Legislative Assembly in 2020 as the State Legal Framework for Science, Technology, and Innovation, placing innovation at the center of the economic and social development strategy of Rio Grande do Sul.

Furthermore, the INOVA RS Program visualizes the state's universities as the main actors in the development of technological innovation in the state. Therefore, it highlights three ICs active in Rio Grande do Sul, namely *Tecnopuc*, *Tecnosinos*, and *Feevale Techpark*, detailed below:

- *Tecnopuc* - Scientific and Technological Park of the Pontifical Catholic University (PUCRS): it hosts more than 150 organizations and among them are branches of Microsoft and Globo.com. It stimulates research and innovation by means of actions between academia, private institutions, and government. It has an internal incubator (RAIAR) and programs to welcome entrepreneurs from the PUCRS network.
- *Tecnosinos* - Technological Park of São Leopoldo, RS: it fosters the development of the Rio dos Sinos Valley, in the metropolitan area of Porto Alegre, RS. It hosts almost 100 national and international companies and is part of the International Association of Technology Parks (IASP).
- *Feevale Techpark* - Rio dos Sinos Valley (Novo Hamburgo, RS and Campo Bom, RS): it is part of the *Innovation Route*, an area comprising the RS-239 and BR-116 highways, and hosts new technology-based companies in the state. It promotes the union between Feevale University, government, and local companies, sharing technologies and generating new business. It operates in

the areas of information technology, communication, nanotechnology, creative industry, health sciences and biotechnology, and environmental sciences and renewable energy.

These ICs are effectively established in Rio Grande do Sul, hosting different initiatives and actions by different actors, so that they foster the development of innovation, technology, and entrepreneurship in the regions where they are located. They are not related to the initiatives carried out in Santa Rosa, however, they can be used as a reference for the proposal presented in this study, as well as spaces to be analyzed in greater detail, as they can be useful for the assessment of ideas that can be replicated in the proposition for the implementation of an IC.

2.2 The city of Santa Rosa and its pathway in the innovation proposition

The municipality of Santa Rosa is the territory in which it is intended to propose the deployment of an IC, so it was necessary to understand the main actions and innovation proposals developed in the territory and headed by actors such as public authorities, representative entities, and educational institutions. Figure 1 shows these main actions and propositions for innovation in Santa Rosa, depicted in a timeline format. The innovation pathway covered in this timeline begins in 2007 and runs until 2019.

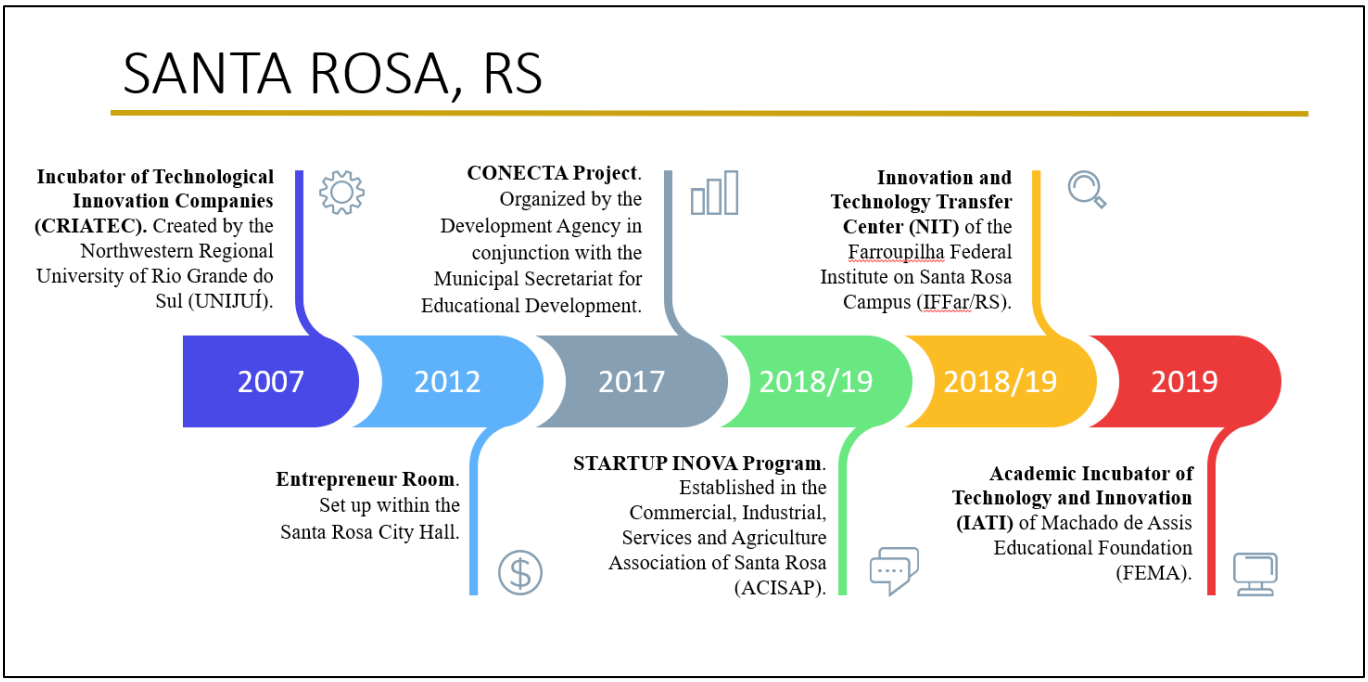

Figure 1. Santa Rosa's innovation pathway

Source: Prepared by the authors.

The *Incubator of Technological Innovation Companies* (CRIATEC) of the Northwestern Regional University of Rio Grande do Sul (UNIJUÍ) has as its mission to leverage entrepreneurship and innovation in the university's area of operation, focusing on businesses in the areas of information technology and communication, renewable energy, residential and industrial automation, energy efficiency and quality, food technology, health, creative economy, and agribusiness. It has a qualified physical and technological infrastructure to serve the incubated companies, composed of rooms for individual use, coworking, laboratories for creative solutions, prototyping and testing, training room, and meeting and videoconference room. It also has a partnership with the laboratories of the university in which it is located. It started the business of five startups of current national success.

The City's *Entrepreneur Room* aims to be a reference place for entrepreneurs in Santa Rosa, with the objective of carrying out actions that make it possible for companies to act towards business success. It offers services related to assistance for the registration and formalization of ventures, forwarding of necessary licenses and documentation, and specifically sets out guidelines for individual microentrepreneurs.

The *CONECTA Project* has as its target audience teachers from the city's municipal education network. From the digital literacy project, it inserts active methodologies and concepts of entrepreneurship in Basic Education of public and private networks, with the prospect of beginning results from the eighth year of education. In 2019, it reached 350 teachers and 2,500 students and in 2020 the perspective was 400 teachers and more than 3,000 students.

The *STARTUP INOVA Program* aims to formulate, implement, manage, and execute actions to connect innovative businesses to the local industry. It establishes a look at the municipal entrepreneurial environment, which is treated as a public policy to encourage the generation of business, employment, and income. Its premise is to promote the connection of the local industry with innovative businesses, through objective and result actions, and to encourage the formalization of new businesses, acting proactively in order to seek solutions to the demands presented.

The *Innovation and Technology Transfer Center* (NIT) of the Farroupilha Federal Institute on Santa Rosa Campus (IFFar/RS) aims to protect the technologies developed within the educational institution and to promote the technological transfer of generated knowledge. Among the activities, it encourages actions based on technological development, innovation, and entrepreneurship, promotes the integration of IFFar/RS with companies and the community and seeks economic, technological, and social development, especially in the region covered.

The *Academic Incubator of Technology and Innovation* (IATI) of Machado de Assis Educational Foundation (FEMA) aims to promote entrepreneurship and innovation to support innovative technology-based companies created by students of the institution. It aims to bring the academic environment closer to the business market, stimulating the entrepreneurial attitude and generating innovative products and services, whose processes or products or services have relevant market perspectives.

Given these initiatives and their characteristics, it appears that the innovation pathway in Santa Rosa is recent and includes few actions and projects, with a low level of orchestration between the different actors and entities involved and with only a certain capacity to influence between each other. However, for a joint business network to thrive, becoming an Innovation Ecosystem, it is necessary to have an attraction between actions, which, even acting on several fronts, demand behavior that aims to multiply.

2.3 Case study: an Innovation Center in Santa Rosa

Along the innovation pathway of Santa Rosa exposed above, it is observed the creation of a Technological Innovation Center (NIT) in 2018, which is located on the IFFar/RS Campus, an educational institution that has been offering technical (high school), higher, and graduate level courses to the community for over ten years. In addition to the recent creation of the NIT, the IFFar/RS has other environments focused on the promotion of innovation, i.e., it has a *Pre-Incubator*, an *Incubator*, a *Research and Application Laboratory in Management, Innovation and Organizational Development* (Lab_DO), and practice laboratories regarding the development of furniture, buildings, and electromechanics.

The Incubator provides an environment to develop ideas for new businesses or enterprises that wish to invest in projects, with the housing, for certain periods, of entrepreneurs, innovative actions, startups, or specific R&D projects of established companies. The Lab_DO is linked to the *School of Management and*

Business (EGeN) and provides an environment for studies, training, and coworking, and includes the space of the NIT, which manages the innovation policy of IFFar/RS, and of the pre-incubator, which is in the beginning of mentoring activities. The *Furniture, Building, and Electromechanical Laboratories* are linked to the technical level courses and provide the opportunity to put knowledge into practice.

Due to these characteristics, it can be seen that IFFar/RS generates subsidies and encourages the development of entrepreneurial and innovative activities, from the articulation between the academic and economic environment of Santa Rosa. However, these activities occur in an incipient way, especially in view of the time of operation of IFFar/RS, and are usually linked to the courses offered and, therefore, occur in an isolated and disconnected way, that is, they are not worked in an interdisciplinary way, which leads to low potential growth of the projects executed

It is noteworthy that, in view of an analysis of Santa Rosa's reality, we sought to focus this study on the analysis of the IFFar/RS case because most of the authors have some link with it, which sharpened the interest in studying an environment that was known to those involved. In addition, considering the existing initiatives in that space, the opportunity to treat the IFFar/RS as a propelling agent in the articulation and implantation of the IC proposed in this study was envisaged, with the intention of making it orchestrate other innovation initiatives in the city.

3. Methodological procedures

This topic presents the methodological procedures used in this study to elaborate a proposition for the implementation of an IC in Santa Rosa. Therefore, it exposes the research classification, the context of the study analysis, the research participants, and the collection and analysis of the data obtained.

3.1 Research classification

This study aims to develop recognition and mapping steps that generate the proposition of the implementation of an IC in Santa Rosa, and was classified according to the purpose, the general objectives, the methods used, and the approach, as presented below.

Regarding the purpose, it is characterized as an applied research, which is defined by Gil (2018) as a study that aims to solve problems identified in the context of the societies in which the researchers live. It received this characterization because it aimed to propose a solution to the innovation challenges found in the city, from the application of knowledge about the theme.

Regarding the general objectives, the classification is exploratory research, which is characterized by having the purpose of providing more information about a specific subject, in order to build objectives and formulate options for research (GIL, 2018). In this study, we started with the objective of proposing the implementation of an IC and, to accomplish it, we explored the analyzed context, aiming to capture information that would validate that idea.

Regarding the methods employed, the study has an action research character, through which it is used a narrative literature review, according to Ferrari (2015). The action research strategy aims to improve the practice of something specific, while applied research often involves the approach of participants with less distinction between action and research, because people are interested in practical solutions to problems (MERRIAM, 2009).

Thus, the classification as action research is made because previous studies on the theme were researched, beginning from the discussion with specialists who conducted and collaborated with the study, through the course from which this research comes: the *Networked Innovation Habitats* course offered by the Graduate Program in Engineering and Knowledge Management at the Federal University of Santa Catarina (UFSC).

The survey of reference cases at the international and national level was also integrated, summarizing information and evidence from the selection of literature that contributed to support the research proposition. From the action research, based on the questioning about how the literature presents the IC concept, its strengths, and contributions, knowledge about ICs was synthesized and greater understanding about the theme was generated, under different perspectives.

3.2 Analysis context

The city of Santa Rosa, located in the Northwest of the state of Rio Grande do Sul, which, in turn, is located in the South of Brazil, is known as the "National Cradle of Soybean". The geographical location of the city is strategic, for even though it is distant from the other Brazilian states, on the other hand, it borders countries such as Argentina, Paraguay, and Uruguay, a situation that favors foreign trade relations. It is located 1,400 km from Buenos Aires, capital of Argentina, 576 km from Asunción, capital of Paraguay, and 964 km from Montevideo, capital of Uruguay. The distance between Santa Rosa and Porto Alegre, capital of Rio Grande do Sul, is 550 km.

According to data from the Brazilian Institute of Geography and Statistics (IBGE, 2020), Santa Rosa had a population of 73,575 inhabitants, 89.8% urban and 10.2% rural. From 1999 to 2017, the annual Gross Domestic Product (GDP) showed growth, so that in 2017 it totaled R$ 2,810,000.20 (US$ 848.942,65). Regarding companies by sector, 43% are in services, 37% in commerce, 10% in the transformation industry, 8% in construction, and 2% in agriculture

The city has a good hotel structure for visitors, and works with Event Tourism with three large consolidated Fairs, several bars and restaurants, local commerce with different enterprises, an airport, and an Exhibition Park, which can hold several events. Thus, 55% of its economy is concentrated in the trade and services sectors. Also with an agricultural vocation and a culture focused on the metal-mechanic industry, over the last decade, the city has been seeking innovative alternatives to incorporate into its economic and development matrix.

Santa Rosa has a Human Development Index (HDI) of 0.769, considered as high development, while its HDI-Income (0.752) is still below 0.8, which is the limit between low and high indices. In these terms, it is necessary to look at the economic development of the municipality and propose strong actions capable of accelerating the development processes and changing this trend.

3.3 Research participants

To identify the form of organization and the challenges faced by Santa Rosa with regard to initiatives aimed at innovation, a group of stakeholders was contacted, with the intention of listening to them in a conversation. As a criterion for the selection of this group of stakeholders, were considered professionals who are leaders in the community regarding the representativeness of entities belonging to the areas of education, business, and public power.

Considering this criterion, a population composed of members of the education area participated in the research, i.e., the General Director, the coordinators of the NIT, the Technological Incubator, the Business Course, and the Lab_DO, as well as the Pro-Rector of UNIJUÍ. Professionals who work in the business world also participated, i.e., the presidents of the Development Agency and the Commercial, Industrial, Services and Agriculture Association of Santa Rosa (ACISAP). Also, representing the government, the Municipal Secretary of Economic Development, Tourism and Technology of the City of Santa Rosa participated in the research.

3.4 Data collection and analysis

This study originated from the realization of the discipline *Networked Innovation Habitats*, offered by the UFSC, and the methodology used for the execution of the present proposition is called the Via Cycle Methodology. This is a methodology licensed by the *UFSC VIA Knowledge Station* group and is based on the combined approaches of the active education methodologies. It is a methodology based on the analysis of places and their problems, aiming at active learning, through which those involved (in this case, student researchers and teachers) identify real situations and make propositions for the improvement of a given territory, with experiential and immersive actions. Six working stages compose this methodology: (1) Challenges, (2) Personas and Actors, (3) Solutions, (4) Stakeholder Partners, (5) Proposition, and (6) Demoday.

For the collection and subsequent analysis of the study data, the Via Cycle Methodology was used as a reference. Steps one and two served to collect the necessary data for the study, which validated the objective of the work to propose the implementation of an IC in Santa Rosa. In the data collection step, an online meeting was held with the research participants, without the use of instruments, and a conversation was held with the objective of hearing the participants' opinions about the theme. Step three, on the other hand, served as a basis for data analysis, based on the authors' need to analyze the collected data in order to propose solution strategies, in view of steps four and five. Step six was the final presentation to those involved in the Networked Innovation Habitats course.

Therefore, initially, the actors that operate in Santa Rosa and the personas that could be benefited by the propositions made during the study were identified. The actors were identified by capturing the initiatives that make up the innovation pathway of the city, while the personas were defined based on the groups of people who could take part in the development of the study's proposed solution and benefit from it.

After that, in contact with some of the city's actors, invited stakeholders, and other interested parties, the existing challenges with regard to innovation were identified. The challenges perceived were arranged in a Problem and Solution Canvas, with the objective of facilitating visualization and establishing possible relationships between the challenges. After listing and unfolding each of the challenges, an analysis was performed on the following questions: "For whom are these challenges a problem?" and "Why are these challenges a problem? This analysis had the objective of facilitating the proposition of solutions and directing them to the right personas.

Finally, a strategy plan was proposed, based on the establishment of deadlines, actions, objectives, and stakeholders, with the intention of reducing or eliminating the existence of the challenges identified, with the final objective of implementing an IC in Santa Rosa, based on the application of this strategy plan. The strategies were divided into four groups, called Structural Pillars in order to favor the development of actions: the pillars of Education, Governance, Public Power, and Culture.

4. Results and Discussion

This section presents relevant information about the context of Santa Rosa, with regard to innovation and its proponent actors and personas, as well as the perceived challenges that hinder advances in the growth of innovative potential. The proposed improvement strategies are also described, with a focus on the proposed implementation of an IC, based on the use of the VIA Cycle Methodology.

4.1 The actors in Santa Rosa

In the analysis of the main economic and social characteristics of Santa Rosa, it was also sought to map the different actors that operate in the city in favor of the expansion of innovative activities, besides the

IFFar/RS. The map of the actors was built from the stakeholders known by the working groups. So the actors were arranged in groups, each with similar characteristics. Figure 2 shows the location of these groups within the city, by means of colors. The "Knowledge" group is marked in yellow, the "Innovation Habitat" group in blue, the "Business" group in purple, the "Public" group in brown, the "Institutional" group in pink, the "Fostering" group in green, and the "Civil Society" group in orange. Figure 2 is a capture of the Santa Rosa map that covers the location of the actors involved with the innovation.

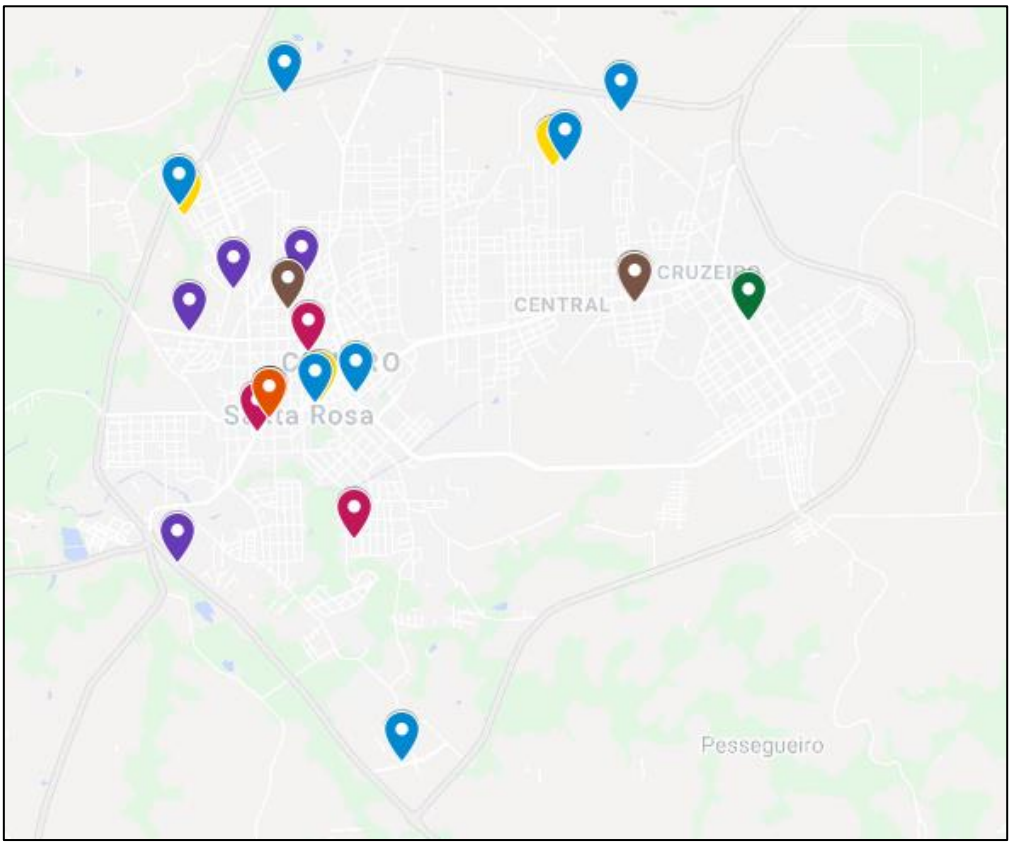

Figure 2. Actors involved with innovation in Santa Rosa

Source: Available at www.google.com/maps/d/u/0/edit?mid=1SuUobcw6izmIV4eHwdDgvLQtWyO7oYWL&usp=sharing.

The following groups of actors were identified in the map of Santa Rosa:

- **Knowledge** - higher education institutions (HEIs): FEMA; IFFar/RS; and UNIJUÍ.
- **Innovation habitat** - environments that promote the interaction of local agents of innovation, R&D developers, productive sector, and Science and Technology Institutions: IATI; Coworking 207; IFFar/RS Incubator; Technological Modernization Pole of the Northwest Border; Metal Mechanical Industrial District; Multi-sector Industrial District; and CRIATEC.
- **Business** - companies, entrepreneurs, students, researchers, professionals, industries, and people with an idea, discovery or invention (incremental and disruptive), which seek to foster this culture: ACISAP; Development Agency; Alibem Alimentos S.A. (a food industry); Biotecno Scientific Refrigerators and Freezers; Camera Agroindustrial S.A. (a food industry); and AGCO Santa Rosa (an industrial assembly company).
- **Public Sector** - institutions that provide mechanisms for programs, regulations, policies, and incentives: Entrepreneur Room; Santa Rosa City Hall; Emater/RS - Ascar Regional Office (State

Association of Technical Assistance and Rural Extension Enterprises - Southern Association of Credit and Rural Assistance - Regional Office).

- **Institutional** - institutions representing the Brazilian "S System": Brazilian Service of Support to Micro and Small Enterprises (SEBRAE); National Service of Commercial Learning (SENAC); and National Service of Industrial Learning (SENAI).
- **Funding** - local financing institution: Sureg Sicredi (regional office of a cooperative financial institution).

After the selection of the main actors that develop actions focused on innovation in Santa Rosa, some stakeholders from these groups of actors were listed, which work directly with the proposition of innovation actions and, therefore, could help in the understanding of the local reality with regard to this theme. Specifically, these stakeholders were fundamental for the exposure of the challenges that the city has been facing in recent years in relation to the expansion of innovation, as well as the explanation of opinions and ideas about possible solutions to those challenges.

The stakeholders selected to participate in this study represented the following groups: the "Knowledge" group, with the participation of the General Director, the coordinators of the NIT, the Incubator, the Business Course, and the Lab_DO of IFFar/RS, as well as the Pro-Rector of UNIJUÍ; the "Public Sector" group, represented by the Municipal Secretary of Economic Development, Tourism and Technology of the City of Santa Rosa; and the "Business" group, composed of the president of ACISAP and the president of the Development Agency.

4.2 The personas that makeup the value proposition

Taking into account the methodology that served as reference for this study, the personas that will be involved and benefited in the execution of the value proposition of the IC implementation in Santa Rosa, as the strategies suggested in the study are implemented, were also analyzed and defined. These personas are representatives of educational entities, such as students and teachers, representatives of private entities, such as entrepreneurs and businessmen, and representatives of public authorities, such as Municipal Secretaries. In Figure 3 the main personas of the territory are identified, i. e., it describes the existing personas in Santa Rosa, based on their identification into five groups, that is, students, faculty, entrepreneurs, businessmen, and public power.

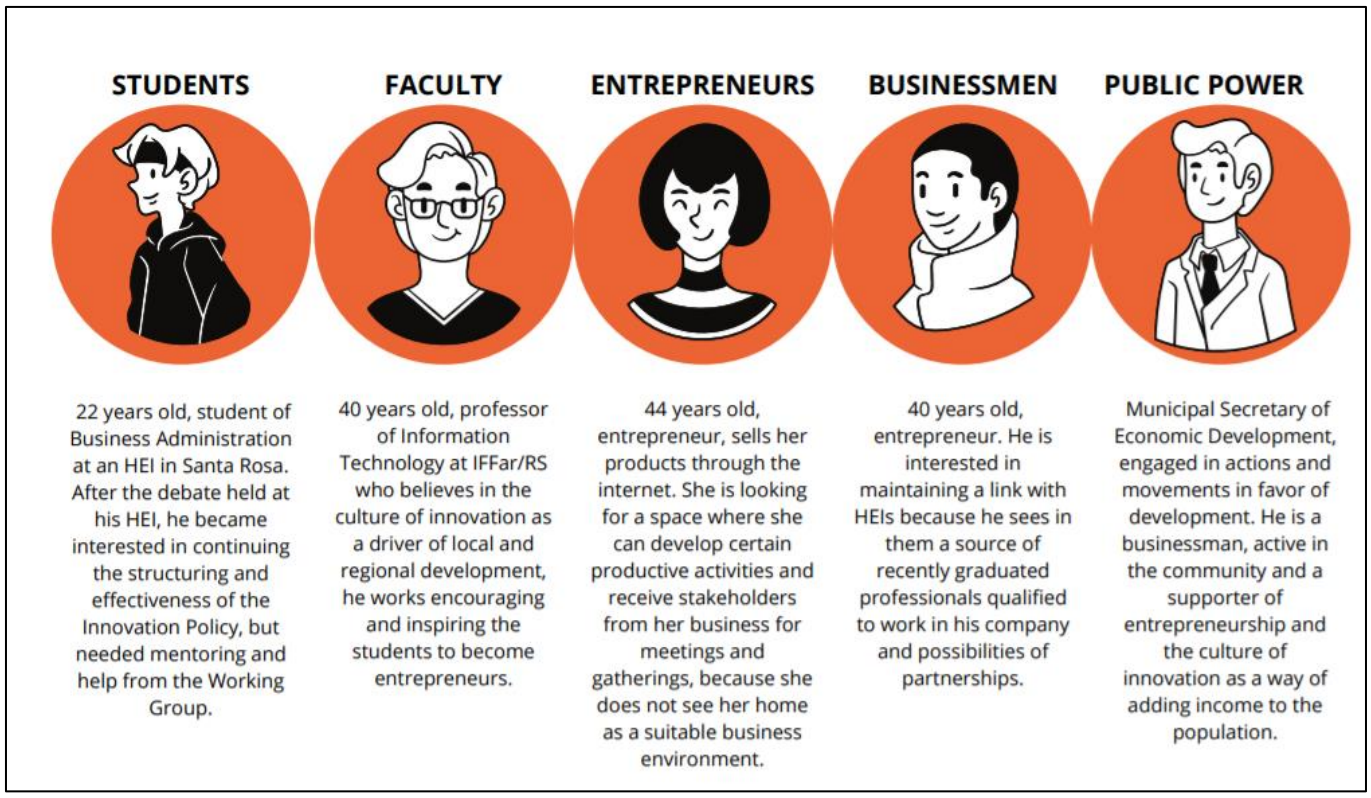

Figure 3. Personas of Santa Rosa
Source: Prepared by the authors.

The Figure 3 describes the existing personas in Santa Rosa, based on their identification in five groups, that is, students, faculty, entrepreneurs, businessmen, and public power.

4.3 The challenges to be faced in Santa Rosa

To identify the challenges in Santa Rosa, a group of stakeholders was contacted with the intention of hear from them about problems and difficulties perceived in city with regard to innovation. Based on this meeting with the stakeholders, the challenges were systematized and presented in a Problem and Solution Canvas, based on the Via Cycle Methodology, which allowed for a systematic understanding of their interconnections and cause-effect relationships. The researchers found the possibility of dividing the challenges into three groups according to the severity of the problem: very serious challenges, serious challenges, and not very serious challenges, which were based on the presentations by the participating stakeholders.

4.3.1 Very serious challenges

The challenges considered as very serious refer to the problems pointed out by most of the survey participants. Their causes were cited in different situations, whose existence hinders the development of actions aimed at innovation. It can be seen that these challenges have long-term solutions since they refer to the city's entrepreneurial culture. Furthermore, they demand continuous efforts, based on the performance of an innovation fostering agent that aims to orchestrate innovation actions, as is the case of the existence of an IC, proposed in this research. Therefore, the very serious challenges perceived are the following:

1. Little integration between the different agents that promote innovation: it is perceived that the different agents that promote actions and projects that deal with innovation, that is, society, government, universities, and companies, act in isolation from each other. Several movements can be seen, with the common focus of fostering innovation, but without integration, partnerships, and joint participation of the promoting propellers. Together, such actions and projects could gain strength and move towards more prosperous pathways; however, isolated efforts hinder an advance that could be achieved in an integrated way and generate collective gains.
2. Difficulties to develop and incorporate the DNA and the culture of innovation: it is observed that the city's population is committed to work and entrepreneurship and many professionals seek to structure their careers in the companies, as well as several businesses arise from people's willingness to undertake and work on their own business; however, there is a difficulty in developing and incorporating the DNA and culture of innovation in the businesses where professionals work. It is believed that managers and employees are focused on developing their routines and their businesses, seeking to maintain production and the supply of services at a pace that generates positive financial results and, for these and other reasons, the culture of innovation is left in the background and even not developed in the organizations.
3. Difficulty to insert companies in the innovation process: actors and institutions in the city, such as ACISAP and the Development Agency, develop actions and projects aimed at innovation, in which private companies participate; however, these actions hardly ever reach the companies' environment, so the collaborators do not have knowledge or access to the information and to the innovation context of the city, in order to apply them in the organizational context. It can be seen that there is a gap in the application of actions that are designed for economic development in the companies.
4. Low propensity for the development of circumstantial businesses: the city has people who have an entrepreneurial profile, as well as being dedicated to work, as exposed in Challenge 2; however, it is observed that there is a low propensity for the development of businesses that generate circumstances that have an impact on the economy and society. This issue is interlinked to Challenge 10, which deals with the city's location, far from the large centers and poles of the state and country, which generates obstacles in terms of logistics.
5. Lack or difficulty to access resources: it was verified that several projects and actions of innovative nature are developed in the city; however, they are promoted in an isolated way. Each actor creates its projects and actions and seeks financial resources from partnerships to develop them, given that they live with the lack of these resources. A recurring problem is that it is usually always the same institutions and companies that contribute financially to the promotion of these actions and projects, which ends up saturating them.

4.3.2 Serious Challenges

The challenges perceived as serious were exposed in specific situations by the stakeholders, because they influence the generation of innovative knowledge in Santa Rosa, however, their impacts are secondary to other problems. They are aspects of the entrepreneurial and teaching culture, lacking continuous initiatives and on the part of the different active actors. Such serious challenges are the following:
6. Talent exportation: in the city there are educational institutions, public and private, that offer technical, vocational, and higher education courses, among others, and train professionals to work in different areas of knowledge. However, it is common for graduates to migrate to other locations, be it in the state, in the country or around the world, to find job opportunities in their field of study or to pursue specializations that

are not available in the city, mainly due to Challenge 4. Thus, the challenge is to keep these professionals working in the city so that it is not necessary to import labor and knowledge from other places.
7. Difficulties to generate and access data about the production matrix: there is no physical or virtual environment available in the city that compiles data about its production matrix. Certain data about the organizations can be obtained from institutions like the City Hall, IBGE, and ACISAP, however, when searching, one encounters dispersion and/or inexistence of the data. This hinders activities and processes that require information about the city's productive dimension. As there is no clarity about the productive matrix, it is difficult to create circumstantial businesses, as shown in Challenge 4.
8. Little diversity of industrial segments and lack of definition of the production matrix: in the city, it is observed the performance of the furniture, industrial, and refrigeration segments and other smaller segments, which do not generate significant highlights. Thus, it is verified that there is no definition of the productive matrix, which makes production decentralized. At the same time, the actions aimed at innovation are not applied in an effective and targeted way, and the companies are limited to taking advantage of the potential and opportunities for business.

4.3.2 Little serious challenges

The challenges considered as little serious are those that exist in the city and impact the innovation process, but arising from other areas that indirectly generate consequences for this process. It is understood that the solutions for them are difficult to be measured, but they can be mitigated from the moment the innovative actions in the city are structured and connected and happening effectively among the different actors, being able to serve as an example of application in other regions close to the territory. Thus, those minor challenges are listed below:
9. Gap in training in different technological areas: there are three higher education institutions in the city, in addition to Distance Learning Institutions, which offer similar training, but there is a gap in the offer of training courses focused on technological and innovation areas. Therefore, the preparation of professionals who will work in these focused areas is not visualized and, many times, they start looking for training in other places and then work in those places, which is related to Challenge 6.
10. Geographic location: the city is located about 550 km from Porto Alegre, the state capital, and far from the central region of the country, where there are large urban centers. Its air access is also restricted to a few dates and times, which makes it difficult to use this means of transportation. This aspect can be seen as a hindrance to the establishment of large companies in the city, considering that adequate business logistics is fundamental to their sustainability.

It was understood that the challenges are problems for the various agents that act and carry out activities in the city, that is, for local society, the Educational Institutions, including students, teachers, and researchers, for the professionals entering the job market, for the innovation initiatives and projects, both those frustrated and those in activity, for the entrepreneurs, the industry, service, and commerce segments, the agribusiness and agro-industries, and the government.
These challenges were found to be problems because they frustrate local development expectations; limit the ability to create innovative businesses and to impact and drive business; limit the use of companies' potential and business opportunities; shelve good projects due to the lack of resources and understanding; scatter resources that are scarce without a continuity effect; do not integrate different actors who work on different fronts; generate low use of people's knowledge potential; embark little or no technology in the processes; do not keep the human capital in the ecosystem to "move up a step"; do not generate innovations

that could increase and/or add income; limit purchasing power; digital literacy is lacking to integrate into the culture and DNA of innovation; and the same actors always pay the bill and promote projects.

4.4 Proposition of a solution to face the challenges

In addition to the challenges displayed on the Problem and Solution Canvas, one could also find the ideas for solutions to those challenges and their explanations, based on the questions "Why is it a solution?" and "What is different about it?". In this context coming from the Via Cycle Methodology, the perception of the challenges generated the need to elaborate a general solution proposal, based on strategies, with the objective of facing them. Therefore, it was sought to validate the goal of proposing the implementation of an IC in Santa Rosa.

Therefore, we worked with the creation of such strategies from the perspective of four axes of action, which were called structuring pillars: Education, Governance, Public Power, and Culture. In each of these pillars the following strategies are identified:

- Education: Define and update the Innovation Policy of the Higher Education Institution (HEI) and its Institute of Science and Technology (IST); and establish and improve debate and initiatives for innovation at the HEI and IST.
- Governance: Create an Innovation Observatory; activate the IFFar/RS Pre-Incubator (NIT/Lab_DO); and strengthen the performance of the NIT.
- Public Power: Propose the creation of a local Innovation Policy; and get closer to the Education Coordinating Office (State) and to the Education Secretariat (Municipality).
- Culture: Be a protagonist in the interlocution with/among the different actors in Santa Rosa.

The strategies were directed towards solving the challenges found in Santa Rosa, focusing on the proposed IC implementation. For this reason, some of these strategies, especially those related to the pillars of Education and Governance, were directed to the IFFar/RS, considering that it is proposed that this institution be the driving agent in the implementation of the IC, as well as with the intention of making the strategies carried out by this actor serve as an example and be expanded to other actors in the city, especially to the other higher education institutions.

The strategies propositions were broken down into deadlines to be met, actions to be carried out, goals to be achieved, and stakeholders to be involved, in order to make their execution possible, directing them to the Innovation Center implementation in Santa Rosa. Table 1 presents the detailed description of all these elements involved in the value proposition for the city, i.e., a proposition for the implementation of an IC in Santa Rosa, with a description of the strategies to be put into practice, unfolding them into actions, deadlines, goals, and stakeholders to be involved.

STRATEGIES	DEADLINES	ACTIONS	GOALS	STAKEHOLDERS
Define and update the Innovation Policy of HEI and IST	12 months	Propose the debate on the Innovation Policy of the HEIs.	Hold the debate at all three HEIs, involving technical (high school), higher and graduate level courses.	General Directors; Innovation Area Directors; Course Coordinators.
		Support the debate on Innovation Policy within the HEIs.	Provide subsidies for the implementation and continuity of the Innovation Policy at the HEIs.	Faculty and Students; Course Coordinators; External Mentors.
Establish and improve debate and initiatives for innovation at the HEIs and IST	12 months	Discuss strategies and initiatives for promoting innovation in institutional spaces.	Motivate entities and the population about the importance of innovative initiatives.	General Directors; Innovation Area Directors; Course Coordinators.
		Implement actions to foster and develop innovations in institutional spaces.	Provide access to all and make actions visible and systemic.	Innovation Area Directors; Course Coordinators.
		Promote extension programs and courses on innovation.	Disseminate the culture of innovation.	Innovation Area Directors; Course Coordinators; Graduate Faculty and Students.
		Promote short courses on innovation.	Disseminate the culture of innovation with speed and scale.	Innovation Area Directors; Course Coordinators; Graduate Faculty and Students.
Create an Innovation Observatory	18 months	Map and characterize the Ecosystem of Santa Rosa (make, update, keep updated).	Have a clear diagnosis of the actions triggered by the various actors.	Entrepreneurs; Public Power; Innovation Area Directors; Course Coordinators; Graduate Faculty and Students.
		Carry out technological prospection studies.	Broaden the debate on the economic and productive vocation (possibility).	Entrepreneurs; Public Power; Innovation Area Directors; Course

				Coordinators; Graduate Faculty and Students.
		Forecast guidelines for fundraising focused on innovation projects.	Be prepared to raise funds as opportunities become available.	Innovation Area Directors; Course Coordinators; Graduate Faculty and Students.
		Encourage through assisting in the development of projects focused on Innovation and Local Development with the different actors of the ecosystem.	Optimize the Administration laboratories and academic offices, giving students the opportunity to practice the elaboration and funding of public resources as a complementary activity to their education.	Innovation Area Directors; Course Coordinators; Graduate Faculty and Students; Public in general.
		Provide documented evaluation strategies through goals and success indicators, developing joint management analysis.	Optimize the Administration laboratories and academic offices, giving students the opportunity to practice the elaboration and funding of public resources as a complementary activity to their education.	Innovation Area Directors; Course Coordinators; Graduate Faculty and Students; Public in general.
		Identify strengths and weaknesses in terms of local needs.	Have a clear diagnosis of the city's economic vocation and culture.	Entrepreneurs; Public Power; Innovation Area Directors; Course Coordinators; Graduate Faculty and Students; Community in general.
		Foster marketable solutions.	Generate business opportunities for entrepreneurs.	Population in general.

		Act in promoting the culture of innovation and contribute to the formation of entrepreneurial minds.	Sustainable economic, social, and environmental development.	Entrepreneurs, Public Power Actors, Innovation Area Directors; Course Coordinators, Graduate Faculty and Students; Community in general.
Activate the IFFar/RS Pre-Incubator (NIT/Lab_DO)	6 months	Structure the operation.	Start the activities of the Pre-Incubator within two months.	Coordination and scholarship students from NIT and Lab_DO.
		Present a public notice for access and use.	Expose and disseminate the public notice to the academic and external community for one month.	Coordination and scholarship students from NIT and Lab_DO.
		Encourage and/or capture proposals and ideas from students of IFFar/RS courses.	Know at least one proposal or idea coming from each class.	Professors and students of the IFFar/RS courses; Directors of the HEI; Lab_DO and NIT Working Groups.
		Encourage and/or capture external proposals and ideas.	Capture 10 ideas in a month.	City Working Group; Private partnerships; Radio stations.
Strengthen the performance of the NIT	Undetermined	Plan and organize operations in accordance with the Brazilian National Innovation Law.	Plan and organize operations within three months.	NIT Coordination; City Working group
		Contribute to the management of pre-incubated and incubated enterprises by means of consultancy and follow-up.	Maintain a monthly consultancy and follow-up program for pre-incubated and incubated enterprises.	NIT Coordination; Incubator entrepreneurs; City Working Group.
		Develop attractive force providing space for productive activities and meetings of the production chain.	Develop attractive force from 2021 on, both for the internal community of IFFar/RS and the external community.	NIT Coordination; Entrepreneurs.

		Promote the articulation and involvement of different interest groups: political, corporate, and social.	Maintain the participation of at least one member of each interest group in NIT activities.	Political agents; Corporate agents; Society in general.
Propose the creation of a local Innovation Policy	24 months	Include in the government agenda the proposal for a Public Policy to Encourage Innovation.	Ensure the maintenance of the project with the provision of human and financial resources.	NIT Coordination; Entrepreneurs.
		Support the debate for the creation of the Innovation Policy.	Generate understanding about the importance and relevance of innovation initiatives for the society in general.	Entrepreneurs; Public Power; Innovation Area Directors; Course Coordinators; Graduate Faculty and Students.
		Become an active player in the definition and performance of the Innovation Policy.	Apply knowledge and intelligence to consolidate actions into new opportunities for the population.	NIT Coordination; Incubator entrepreneurs; City Working Group.
Get closer to the State Education Coordinating Office and to the Municipal Education Secretariat	12 months	Articulate actions to foster innovation and entrepreneurship in the State Education Network.	Include subjects related to Entrepreneurship and Innovation in the curriculum.	NIT Coordination; Incubator entrepreneurs; City Working Group.
		Articulate actions to foster innovation and entrepreneurship in the Municipal Education Network.	Include subjects related to Entrepreneurship and Innovation in the curriculum;	NIT Coordination; Incubator entrepreneurs; City Working Group.
Be a protagonist in the interlocution with/among the different actors in Santa Rosa	Undetermined	Investigate the perception regarding the processes that mobilize transformations in various contexts.	Apply the knowledge and intelligence that the initiative demands to consolidate actions into new opportunities for the population.	NIT Coordination; Incubator entrepreneurs; City Working Group.

		Disseminate research results to potentialize new researchers and innovative business scientists.	Disseminate and engage the population to the proposal.	NIT Coordination; Incubator entrepreneurs; City Working Group.
		Promote technology transfer through partnerships with associations, companies, and Chambers of Commerce.	Generate new business opportunities with innovation and incremental economy.	Entrepreneurs; Public Power; Innovation Area Directors; Course Coordinators; Graduate Faculty and Students.
		Define criteria for strategies, considering short, medium, and long terms, to operate with the other actors.	Generate engagement of the entire population of the city.	Entrepreneurs; Public Power; Innovation Area Directors; Course Coordinators; Graduate Faculty and Students.

Table 1. Feasibility strategies for implementing an Innovation Center in Santa Rosa

Source: Prepared by the authors.

As can be seen, this study conceived a proposition of strategies for Santa Rosa through the use of the Via Cycle Methodology. The strategies were listed in four groups represented by structuring pillars, which made reference to the actors and personas that act in the city proposing initiatives aimed at innovation. Many of the proposed strategies were directed to the IFFar/RS, that is, to the IC used as a reference in this study, with a view to its replication for other agents promoting innovation in the territory, as well as aiming to connect the city's innovative initiatives to enhance the desired results.

5. Final Considerations

This study aimed to develop stages of recognition and mapping of elements that underpin the implementation of an Innovation Center in Santa Rosa, with the use of the Via Cycle Methodology. To accomplish that, it comprised the steps of identifying the challenges relevant to innovation faced in the municipality, detailing the personas and actors involved in the innovation process, capturing stakeholder partners, and proposing solutions to the challenges encountered, from a value proposition arranged in a strategy plan. In this context, we worked with IFFar/RS as an important actor for the orchestration of the implementation of the proposed IC.

For the development of the study, initially the characteristics of Innovation Centers were studied. It was understood that ICs are characterized by regional development functions focused on innovation, by means of business, facilities, services, resources, culture, and the connection between innovation and entrepreneurship. Some reference institutions in this typology were also analyzed, from an international context to a local context. The research of international and national cases as references of IC, aligned with the use of the Via Cycle Methodology, allowed the development of recognition and mapping steps for the preparation of this study and make available results that can contribute to improve innovation in the city.

During the analysis and discussion of the research, correlated structuring pillars that are the foundation of innovation became evident, that is, education, governance, public power, and culture. The breakdown of these pillars into detailed actions in their scope and monitoring subsidized a plan built and validated collectively, generating confidence, commitment, and high expectations for the implementation. It is also noteworthy that the IC proposed in the study has significant educational, social, cultural, and economic potential to develop the suggested strategies whose practice can serve as references to boost similar experiences in the city and in other regions.

In view of the above, it is considered that the proposition resulting from this study proves to be very feasible to be realized, as it contemplates the identified needs, the opportunity for involvement of the actors, the listening of these, as well as for the analysis and openness to the protagonism. It is understood that, from the practice of the proposed strategies, it will be possible to eliminate or alleviate problems and challenges, meet needs, and strengthen different dimensions, such as culture, business, and technological development, among others. In this sense, another relevant aspect of the methodology adopted was to enable the understanding of the steps to be followed, leading to the engagement in order to reach the converging objectives.

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