

Sub-theme:

6. Technology transfer and entrepreneurship: 'traditional' and new Science-industry interface organizations, mechanisms, organizational designs, networks, etc.

6.1 Start-ups, spin-offs, science parks, business incubators, technology transfer offices, joint research projects, in-firm (company) universities, business acceleration centers, corporate incubation, university proof-of-concept centers, etc.

Title:

THE ROLE OF INOVAPARQ AS THE DRIVING FORCE OF RELATIONSHIPS AMONG THE ACTORS OF THE TRIPLE HELIX IN THE NORTHERN REGION OF SANTA CATARINA, BRAZIL

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Abstract

The article analyzes the role of Inovaparq - Joinville Regional Park for Technology Innovation in the environment of the innovation regional system, according to the concept of the triple helix. From the case study of Inovaparq, the analysis of the context previous to the implementation, the implementation process and current status, the article argues that for the triple helix to move toward the realization of innovation, there needs to be in the environment, the figure of an institution that acts as a driving force, stimulating the actions and relationships in this environment. Also used is the model of organizational roles proposed by Da Silva and Maciel (2009), from the Team Roles model of Meredith Belbin (1981). The study demonstrates the leadership role assumed by Inovaparq, and from the findings presented, suggests some directions for future research.

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Introduction

Having as context and background the transformations that the academic environment experiences, especially considering the so-called third academic revolution (Etzkowitz and Viale, 2011), in which universities must adopt an entrepreneurial posture, the creation of innovation habitats presents itself as an opportunity to answer these demands. A habitat for innovation should create conditions for the development of technological processes with economic purposes, thus presenting an environment in which different actors of the triple helix are represented. This environment should also stimulate the interactions between these actors in order to allow innovation to take place.

Technology parks have been taken into consideration in the formulation of industrial, technological and regional policies for regional development, both in developed and developing countries, as potential elements in the transfer of technology generated by research; in stimulating the creation and strengthening of micro, small and medium technology-based firms and in promoting and subsequently enhancing competitiveness of these companies; in generating jobs and increasing the entrepreneurial culture and activity, in particular those of a technological nature.

In response to the challenge presented, the universities located in Joinville, Santa Catarina, in southern Brazil, developed Inovaparq - Joinville Regional Park for Technology Innovation. The decision to develop the enterprise took place on the one hand, from the reading of regional demands in terms of the need to increase the innovative activities in the region, and on the other hand, given the existence of some conditions for this development. From there, some actors of this network began to adopt certain roles in the environment, to make feasible the implementation of the park. This paper discusses the importance of these roles from a proposed organizational roles model and characterizes Inovaparq as the driving force of the relationships among the actors of the triple helix in the northern region of Santa Catarina.

State-of-the-art

Inovaparq presents an innovative management structure, composed of four universities located in Joinville, Santa Catarina, Brazil: the Federal University of Santa Catarina (UFSC, Universidade Federal de Santa Catarina), the State University of Santa Catarina (UDESC, Universidade do Estado de Santa Catarina), the University of Joinville Region (UNIVILLE, Universidade da Região de Joinville) and the Catholic Institute of Santa Catarina.

The perception that the demands and environmental conditions could be organized to stimulate the regional innovation system was based on the concepts of the triple helix (Etzkowitz and Leydesdorff, 1997) and on the definitions of science and technology parks of the International Association of Science Parks (IASP), from the perception that

a science park, by nature, has certain characteristics and potential to act as an aggregator and facilitator in the triple helix model.

The triple helix model (Etzkowitz and Leydesdorff, 1997), explains the need for interaction between universities, companies and government to stimulate and develop innovation. Therefore, there should be relevant actors representing each of these spheres, as well as the occurrence of interactions and relationships among these actors, thus making up a network. In line with this vision, IASP identifies science parks as instruments capable of "promoting a culture of innovation and competitiveness among companies and institutions that generate knowledge, either installed in the park or associated with it". To achieve this goal, a science park "stimulates and controls the flow of knowledge and technology among universities, research institutions, companies and markets". (IASP, 2011)

Historically scientific and technology parks have been characterized as important elements in establishing innovative regions. The first generation of parks arose spontaneously from the existence of very favorable pre-conditions for the development of new technology-based companies and university-industry interactions. Some of these parks stood out when projecting their regions to the global economy. From this success, and trying to reproduce it, a second generation of parks was planned and built with the goal of developing promising business environments globally, creating and attracting innovative companies and promoting university-industry relationships (ANPROTEC/ABDI, 2008). However, this second generation did not achieve the expected results (HANSSON et al., 2005). Then, comes the third generation of parks, as part of national or regional policies, aiming at promoting significant economic development in emerging countries or regions. This goal is pursued based on factors such as: easier access to technology and availability of skilled labor, among others.

In different countries, science parks have been used as important elements for enhancing regional competitiveness, attracting foreign investment and supporting the creation and location of technology-based companies.

The success of these initiatives, according to Da Silva and Maia (2009), depend on understanding the key factors that determine the region's innovative capacity, and the policies and strategies needed to feed this process. The authors highlight a number of these key factors, including aspects in the extra-firm, inter-firm and intra-firm environments, pointing out the importance of all these dimensions for the establishment of innovative companies and regions.

This study is interested in discussing some key aspects of an innovative regional environment, especially regarding the interaction between the various actors in the triple helix, in harmony with the understanding that innovation is the result of a multi-disciplinary and non-linear process, more likely to occur under conditions of collaboration among multiple actors in innovation networks (TURA et al., 2008).

Etzkowitz and Viale (2011) describe the third academic revolution. The first and second revolutions integrated research and economic and social development as missions of the university, whereas the third defends the creation of the entrepreneurial university, as the gravitational center for economic development, as well as for the creation and diffusion of knowledge, both in industrially advanced societies and in the developing ones. The authors argue that the entrepreneurial university, in addition to science, produces technology and also innovation, in an ever-increasing pace. These observations demonstrate the expansion of the university's role in the context of a knowledge society and the increase in its relevance in terms of the influence it exerts over the environments into which it is inserted.

The development of the relationships among university-industry-government can be viewed, according to Etzkowitz and Viale (2011), from a historical and evolutionary perspective, based on the stages of the industrial revolution. This perspective starts with the Single Helix model, in which the level of relationships between university and industry was very low, mainly due to the difficulty of communication imposed by an industrial context with a high level of tacit knowledge, but a low level of explicit knowledge. As knowledge started to be explicit, relationships evolved, but were still hindered by methodological and epistemological problems, characterizing the Double Helix model. The Triple Helix, entails deeper relationships among university-industry-government, in order to reach cognitive and epistemological integration, which, according to the authors, can only be attained from the university-centered innovation model. In the Triple Helix environment, “given an active civil society, initiatives will come from nongovernmental sources, especially at the regional level” (Etzkowitz e Viale, 2011: 601). Collaboration in this environment facilitates the emergence of hybrid institutions.

These observations corroborate the role played by Univille and Inovaparc in the context of the regional innovation system. Univille has taken action to adopt a posture of an entrepreneurial university.

From the vision of a triple-helix environment in which relations among the institutions of the three spheres are intense and leadership does not necessarily come from the public authorities, to adopt a perspective of understanding the roles that institutions take over or tend to assume when acting in a network can not only facilitate the understanding of relations in the environment but also allow these roles to flow more properly towards a better performance in this environment.

The mere existence of institutions and an aggregator element such as a park does not ensure that the expected interactions occur and generate the innovative environment. An illustration of this reasoning may be the performance achieved by the second-generation parks. Another example that confirms the reasoning is presented in the description of the case study that is the focus of this article.

Based on the concepts of Team Roles theory from Meredith Belbin, Da Silva and Maciel (2009) proposed a model of organizational roles that describe the behavior that

organizations can or tend to take in network situations. The Belbin Team Roles theory (1981) describes the different roles adopted by corporate managers working in teams and their respective influence over individual and group performances.

This theory formed the basis for the proposition of the organizational roles model, proposed by Da Silva and Maciel (2009). The different roles are grouped into categories of organizational behavior: leadership, mediation, creativity and production.

Table 1 presents the description of the model, containing the roles that compose each category, its description according to the expected behaviors and possible strong points and weaknesses.

This organizational roles model was applied to the study of science parks in Brazil. In fact, according to the authors, the model was refined and consolidated from the implementation and monitoring of these innovation environments, hence its applicability in network environments such as science and technology parks and more specifically in the case of Inovaparq.

Table 1: Expected Behavior, Strengths and Potential Weaknesses of Organizational Roles

| Category | Role | Expected Behavior | Strengths | Potential Weaknesses |
|------------|---------------------|---|--|---|
| Leadership | <i>Ruler</i> | Directs the activities towards a set of predefined goals often set by a single or small group of major sponsors and other stakeholders; forces action through various forms of institutionalized power. | Makes things happen in a timely manner; follows pre-defined plans; does not compromise the objectives. | Does not listen to opinions of other partners; likely to create rather than avoid conflict with other actors, if plans are not followed; puts the goals in the first place, tends to become isolated. |
| | <i>Networker</i> | Aligns individual goals with the definition of plans for collective action; supports the interaction and acts as a mediator; directs activities to pursue common goals through negotiation, communication, persuasion and visionary skills. | Good at negotiation and conflict resolution; is able to bring in the collaboration of different and even conflicting organizations. | Slow to act because will listen to all partners; can seem manipulative or too political. |
| Mediation | <i>Bonder</i> | Creates formal bonds among organizations, creates and enforces links between organizations; creates an atmosphere of trust in the network. | Necessary to create an atmosphere of trust in the network; creates predictable and formal links. | Tendency to create artificial connections that are inflexible and difficult to shut down; relations becomes rigid by excessive rules and formalization. |
| | <i>Bridger</i> | Encourages collaborative projects and actions among companies and other organizations; creates heterogeneous connections and coincidences that will improve interactions between sectors. | Creates meeting points in the network for new and informal relationships; increases the "collisions" between members that do not relate in the network. | Weak or informal connections may not inspire the confidence to reduce transaction costs in relations among actors |
| Creativity | <i>Creator</i> | Creates original knowledge through scientific and technological development; acts on internal motivation, based on their own strategic choices. | Advances the local knowledge with talents and scientific and technological results aligned with the state-of-the-art; is not limited to local standards, being able to challenge inertia and provoke change. | Prone to the syndrome of the "Ivory Tower"; tendency to isolate themselves from the local context. |
| | <i>Investigator</i> | Searches sources of expertise and knowledge that exist outside the local context, combining them to form new knowledge for the local context; acts motivated by the needs and demands of the network; creates links between the local and external environment. | Brings new ideas from the outside environment; develops external contacts; collectively creates new knowledge; fosters conversation; listens to and tries to meet the needs of the network. | Can be seen as below the average in creating significant advances in the state-of-the-art. |
| Production | <i>Implementer</i> | Produces products and services to the market or as intermediate results to other network organizations. | Delivers results; careful with the quality of deliveries. | Only average in developing advanced and innovative solutions; very focused on short-term issues; does not have the "vision of the forest." |
| | <i>Evaluator</i> | Evaluates programs, projects and actions of other members of the network; assesses the network performance. | Good to point out and analyze alternative directions; judges accurately. | Does not inspire other actors; often seen as pessimistic. |
| | <i>Controller</i> | Conducts formal evaluations of results and performance of organizations. Verifies compliance of formal protocols and institutionalized regulations; imposes penalties. | Methodical; predictable; looks for errors and omissions. | Orthodox; inability to see alternative possibilities out of their doctrine; lack of innovativeness. |

Source: Da Silva e Maciel (2009)

Methodology

From theoretical reference about innovation environments, the triple helix model and the role played by the different actors present in this model, the article presents a case study of Inovaparq - Joinville Regional Park for Technology Innovation. The focus of interest is to investigate the role that Inovaparq has played in the environment of the local innovation system. A historical perspective on the development of Inovaparq is adopted, as well as on other elements of the environment, to facilitate in viewing the context and understanding the roles played by different actors and in particular by Inovaparq. The description of the study case is based on the experience of the authors as developers of the project and members of the implementation and management core group of Inovaparq.

Findings and Interpretation

Inovaparq - Joinville Regional Park for Technology Innovation is installed in the city of Joinville, Santa Catarina, in southern Brazil and presents an innovative management structure, consisting of four universities: the Federal University of Santa Catarina (UFSC, Universidade Federal de Santa Catarina); the State University of Santa Catarina (UDESC, Universidade do Estado de Santa Catarina), the University of the Region of Joinville (UNIVILLE, Universidade da Região de Joinville) and the Catholic Institute of Santa Catarina. The activities of this park started very recently, from August 2010, although the project of a technology park in Joinville has been discussed and matured for several years in the city.

Characterization of Joinville

Located in Southern Brazil, it is a hub city of the northeastern region of Santa Catarina. Joinville is the state's largest city, accounting for about 20% of exports in SC. It is also the third industrial hub of the South, especially in the following segments: metal-mechanical, textile, plastic, metalworking, chemical and pharmaceutical. In addition to the developed industrial park, Joinville is the headquarters of some world renowned companies in their business segments (IPPUJ, 2011).

Besides large businesses, Joinville houses the Joinville Region Association of Micro, Small and Medium Enterprises (AJORPEME, Associação de Joinville e Região da Pequena, Micro e Média Empresa), which is the largest association of micro and small companies in Latin America, with over two thousand member companies, operating in various sectors of economy (AJORPEME, 2011). Another important business association operating in the city is the Commercial and Industrial Association of Joinville (ACIJ, Associação Empresarial de Joinville), which brings together the medium- and large-sized companies.

Setting the regional scenario of companies against the concept of the triple helix, it is possible to see that the industry sector is significantly representative of the city of Joinville.

From the standpoint of the organizational roles model, companies are characterized as *Implementers* and entities such as ACIJ and AJORPEME appear as *Bonders* in relation to its members, since its performance results in the establishment of formal ties between the companies.

In the realm of the academy, Joinville has four universities, Univille, an institution created by municipal law in the 1960s, although with no public character. Then there is UDESC, a state public university, which has its Center of Technological Sciences (CCT, Centro de Ciências Tecnológicas) in Joinville. And recently two other universities also came to Joinville, UFSC, a Federal public university, which has installed a *campus* in the city and also the Catholic Institute of Santa Catarina. The quantity and diversity on the offer of places in higher education both for undergraduate and graduate courses has increased. In parallel, a body of researchers is consolidated and scientists working in these universities provide the academic and scientific support to contribute to the innovativeness of the environment.

In the concept of the triple helix, the four universities are the very sphere of academy. It is noteworthy that these four institutions share the management of the park. From the perspective of organizational roles, their first and most natural role is that of the *Creator*. However, given the complexity of the structures and components of the academy itself, possibly other roles may well be played by the university, whether in institutional form or in the form of departments or units with specific expertise.

The public authority, the third element of the helix, is presented in Joinville in a formal structure, with the City Hall and City Council, in addition to the instances of the judiciary. There are also the local representations of state authority and, more indirectly, of the federal authority. The more direct actions happen through such agencies as the Secretary of Economic Integration and Development (SIDE, Secretaria de Integração e Desenvolvimento Econômico), that bears the responsibility of addressing issues related to the innovation environment of the city (Joinville does not have a public agency specifically for this theme, as some other cities). The structure and the actions of the state government, while still centralized in the state capital directly influence Joinville. For example, the Foundation for Research and Innovation of the State of Santa Catarina (FAPESC, Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina) is an important entity with the task of providing support to other agencies in the state in regard to research, development and/or innovation projects. In 2009, FAPESC was responsible for the development of the Santa Catarina Policy for Science, Technology and Innovation, which corresponds to a state planning towards the support of a state innovation system. FAPESC was also the main organizer for Santa Catarina to be one of the first Brazilian states to have a state law on innovation.

Regarding the federal government, its role in the regional system of innovation is important mainly from the standpoint of the establishment of a Brazilian regulatory framework to support innovation. The federal government also maintains, among others, agencies such as the Financing Agency for Studies and Projects (FINEP, Financiadora de Estudos e Projetos),

which provides various mechanisms to support R,D&I projects, including encouraging the development of joint projects between companies and academy.

The instances of public authority represent the third set of entities of the triple helix model. In the organizational roles model, one can understand that the agencies which work directly under the government structure act as *Rulers*, in the broadest sense of the legislature and eventually as *Evaluators* and *Controllers*. As for the agencies that support the public authority, such as FAPESC, in the state context, and FINEP in the national context, it appears that they present a *Bridger* profile.

Other entities - Joinville also has representations with regard to programs and organizations of state and national scope, such as the Brazilian Service of Support for Micro and Small Businesses (SEBRAE, Serviço Brasileiro de Apoio às Micro e Pequenas Empresas). The city also received a Softex Agent, a nationwide program, implemented in 1998, with the aim of boosting the IT industry in Brazil to worldwide level. The implementation of the Softex Agent in Joinville enabled the establishment of the first incubator of technology-based companies of Joinville, Softville. Then, with changes in program guidelines and the decrease in support, Softville lost its focus in the incubation process, retaking it from 2001, when the two universities (Univille and Udesc), plus another higher education institution and the municipal public authority teamed up to reestablish the incubator. Softville has supported the development of technology-based companies since then. Univille acted and still acts directly in the management of this incubator.

Some of these latter entities configure themselves at times as *Implementers* and in others as *Bridgers*, such as Softville.

The description of the environment in the city of Joinville from the entities that comprise it, allows one to notice the existence of organizations from each segment of the triple helix. It is also possible to see the different organizational roles being exercised in the environment. However, despite all the potential of this rich environment, the interactions between members of the incipient local innovation system were few or weak or insufficient, perhaps for lack of continuity and perpetuity of some programs. The failure of relationships hitherto perceived in the environment can also be interpreted according to the analysis of Etzkowitz and Viale (2010), which identify Single Helix and Double Helix relationships, not reaching the three institutional spheres of the Triple Helix and therefore not achieving the desired results.

In this context of weak interactions and at the same time because of its character of an industrial region, the need for an environment which is more conducive and stimulating of innovation became evident from the demands imposed by the dynamics of the global market. Most notably from the late 1990's, some entities of the city took the initiative to start discussions on the implementation of a technology park in Joinville. A brief historical review can identify at least three initiatives led by different entities. For example, one of these initiatives took place with support from the Softville business incubator, with the two universities, Univille and Udesc - sponsors of the incubator - and with representatives of the municipal public authority. However, these initiatives did not succeed, for various prompt reasons. Analyzing this issue from the standpoint of organizational roles adopted in the

present study, one can conclude that the roles and categories (especially leadership and mediation) were not defined and/or assumed by those entities at that moment, or, were not recognized or legitimized by other entities.

Therefore, it is reasonable to conclude that in the case of Joinville, the fact that there are components of the triple helix, does not mean automatically that the components interact in order to generate a positive move in the helix and consequently on the environment. In case studies on the Porto Digital Science Park, in Recife, the same situation is evident (DA SILVA, year; DA SILVA e MACIEL, 2009; DA SILVA and MAIA, year).

The context of Inovaparq implementation

Univille, as a municipal and community university, from its perception and vision of the local demands on one hand, and on the other, the potential existing in the environment, has gradually adopted actions that led it to assume a leadership role in the regional innovation system, as this article argues.

In 2006, Univille implemented the Center for Innovation and Intellectual Property (NIPI, Núcleo de Inovação e Propriedade Intelectual), stimulated by the guidelines in the Legal Act # 10,973, though it was not legally enforced to implement the Center. However, considering the need to foster closer ties between its researchers and the demands of the local industrial sector, it decided for the implementation and preparation of a regulatory environment for such action.

In parallel it remained in managing the technology-based incubator and contributing to discussions about the science park project in Joinville.

In 2007, Univille purchased a lot neighboring its main *Campus* and decided to use this area for the implementation of the science park. This decision was a milestone in the process of establishing Inovaparq.

In the sequence, Inovaparq was created by internal regulations, linked to the Educational Institution of Joinville Region (FURJ, Fundação Educacional da Região de Joinville), maintainer of Univille, which after that also took to maintain Inovaparq. From this point on, Univille initiated a series of discussions with other entities of the city in order to build a network of relevant entities to consolidate the project of the park. The discussions were initiated by the universities of the city. As a result of these discussions, Inovaparq presents an innovative management structure, composed by the four universities located in the city: UFSC, UDESC, UNIVILLE and the Catholic Institute of Santa Catarina. Together, these universities also represent an important scientific-academic basis, capable of promoting and sustaining the innovative activities.

In parallel, cooperation was sought within the relevant business associations, such as ACIJ, AJORPEME, among others. At the moment, AJORPEME and three other entities are important partners in the park. Mainly for AJORPEME, its role is seen as crucial in the

innovation system, since in addition to its role as *Bonder*, it also acts as *Bridger* between the micro and small companies and the universities, as well as the park itself.

From the presentation of the proposal by the management group of universities to the direction of FAPESC, this agency has taken an extremely important role in bringing closer Inovaparq and business associations, making efforts to aggregate entities not yet operating in the project. FAPESC was active as *Bridger* in this process. Besides the important role as a *Bridger*, FAPESC supported the effective implementation of the first phase of the park, enabling the development of the first R & D projects that culminated with the establishment of the technology-based business incubator IBT-Inovaparq.

The discussions also involved the municipal and state public authorities. At present, the role of the Municipal agency in charge at the City hall, has been one of cooperation and collaboration. More than that, the integration of this agency to the discussions of the implementation project aroused in the entity the perception of the need to establish a municipal regulatory framework to support processes related to innovation and technology transfer. As a result, there have been discussions about the Municipal Law of Innovation, in which are involved the entities participant of the regional innovation system. Thus, the city of Joinville assumes the role of *Ruler* (in terms of law and not of leadership in the implementation of the park). Corroborating this interpretation of the municipal government role, recent demands related to the municipal law have been readily accepted and promptly analyzed by the various municipal instances.

Other entities are sponsoring the Inovaparq, such as SEBRAE, both in its local and state representation.

The network relationship has been an important feature of Inovaparq. Since its inception, the park is associated with the National Association of Business Incubators and Science Parks (ANPROTEC, Associação Nacional de Incubadoras de Empresas e Parques Científicos), the Santa Catarina Network of Business Incubators and Science Parks (RECEPET, Rede Catarinense de Incubadoras de Empresas e Parques Científicos) and is finishing the process of affiliation to the IASP. It has recently affiliated to a major Brazilian organization that brings together the key innovators in the country, ANPEI. With these actions it can be said that among the actions as *Networker*, Inovaparq can also be recognized by other organizational roles, such as *Bridger* and *Bonder*.

In terms of infrastructure, the Inovaparq implementation project is organized into seven steps. Currently, the first step is completed, with the implementation of the business incubator, including the construction of the building, the setting of operational processes and the effective start of incubation activities. There are six innovative companies in Inovaparq, three of which are academic spin-offs and one is a business spin-off.

The case of Inovaparq did not have an onset marked by a leadership of the *Ruler* kind, as in some other parks. There was no figure of institutionalized power or authoritarian leader. However an active role in leadership was necessary for the implementation of the science park to be feasible in Joinville, even despite the prior existence of the actors needed for this

purpose. This role was initially taken by Univille itself, and after by the other universities that comprise the park management and later by Inovaparq itself. At this point, they presented the behavior and performance of a leadership of the *Networker* kind. As described in the model, its performance was and has been characterized by the pursuit of common goals through negotiation, communication, persuasion and visionary skills.

Once more it is noteworthy to attest, in the innovation environment of Joinville, the pertinence of the observation of Etzkowitz and Viale (2011) that, in Triple Helix environments which have an active civil society, initiatives arise from non-governmental sources, especially in a regional context.

Table 2 shows the synthesis of the roles of various entities and local actors in the actions for the implementation of Inovaparq.

Table 2: Organizational roles engaged in the implementation of Inovaparq

| Actor | Role |
|--------------------------------------|-------------------------------|
| Univille | <i>Networker and Creator</i> |
| Inovaparq | <i>Networker</i> |
| UFSC | <i>Creator</i> |
| Udesc | <i>Creator</i> |
| Catholic Institute of Santa Catarina | <i>Creator</i> |
| Univille/NIPI | <i>Bridger</i> |
| State Government | <i>Ruler (in legislation)</i> |
| Municipal government | <i>Ruler (in legislation)</i> |
| FAPESC | <i>Bonder and Bridger</i> |
| Ajorpeme | <i>Bonder</i> |
| Softville | <i>Bridger</i> |
| Companies | <i>Implementers</i> |

Indeed, the observation of these actors in the environment and the kind of dynamics among them, shows that the existence of relevant actors in the environment, yet diverse enough to represent the constituents of the triple helix, the development process of innovation does not happen automatically or spontaneously. It requires the existence of mechanisms capable of activating the helixes, moving them toward innovation.

Conclusions

From the perceptions that, first there need to be actors to make up each helix and on the other hand, these actors play specific roles in the network, it was noticed that Inovaparq acted and still acts as the driving agent, able to stimulate certain relationships so that interactions occur and result in productive activity within the local innovation system.

The role of Inovaparq as networker has been instrumental in boosting the regional innovation system in the north and northeast regions of Santa Catarina, validating four immediate conclusions as the contribution to the study of environments that promote innovation:

1. The need for an active facilitator between the actors of the triple helix, capable of promoting the interaction between the vertices of the helix and its subsequent movement towards the promotion of innovation;
2. The facilitator needs to assume a posture of active leadership;
3. The organizational role model proposed by Da Silva and Maciel seems to fit well to the demands imposed for the success of such initiatives. Most notably as regards the role of leadership of the *Networker* kind;
4. The need for each actor to ensure the evolution of their posture and performance in tandem with the evolution of the park implementation and, subsequently, with the maturing of the park, along with the other entities and their relationships, which also mature.

Other conclusions, now on the regional innovation system of Joinville, and the role of Inovaparq:

1. The need to attract new actors into the system to fill the remaining gaps according to the organizational roles model;
2. The need to attract new actors with different activities from the currently available ones in the environment;
3. For some of the actors already present in the environment, to stimulate the action according to some roles of the model yet undeveloped;
4. Pay attention to what must be the work of Inovaparq in order to continue acting as facilitator and *Networker* from now on and as the implementation of the park evolves.

Directions for further research

The conclusions presented in this discussion under the contribution to the study of innovation environments and within the regional innovation system have, in fact, a number of proposals for further studies in order to verify their validity, especially regarding the fact that Inovaparq is still quite a young entity. As the implementation steps of the park go forward and as the local system itself evolves, this research on this environment will be maintained in order to continuously verify the validity of the proposals and conclusions presented here.

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