1. **Subtheme for which the paper is intended**: **S4 University in regional innovation and social development**
2. **Keywords**: regional development, innovation habitat, S&T Park, innovation system
3. Structure:

**A PROPOSAL TO integrate the universitY into s&t parkS & regional DEVELOPMENT POLICIES – THE EXPERIENCE OF UNIVERSITY OF SÃO PAULO (BRAZIL) CENTER FOR TECHNOLOGY POLICY AND MANAGEMENT**

**introduction**

The culture of innovation is a holistic concept that involves the creation process, the flow of ideas, the idea of sustainability and interpersonal relationships. From the perspective of a S&T Park as an innovation habitat, the role of the university is mainly focused on the creation process.

The flow of ideas, sustainability & interpersonal relationships aspects of the culture of innovation are usually understated. Nevertheless, they are essential, for example, to increase the involvement of companies in university processes such as cooperative research, to stimulate entrepreneurship, and to foster innovation habitats. These aspects are also relevant to integrate universities into governmental programs in charge of public policies for local/regional development.

Along this line, University of São Paulo (Brazil) Center for Technology Policy and Management (PGT/USP) took upon itself a challenge of transformation, by creating a new focus on knowledge and innovation-based local/regional development. The transformation had two components. Firstly in terms of subject, as PGT/USP, composed mainly of faculty from the University engineering, management and economics departments built its competence and got recognition in the field of industrial innovation management. Secondly in terms of nature, as the Center went beyond the traditional academic research agenda. In fact, PGT/USP assumed an active role in the knowledge and innovation-based development process of selected cities in the State of São Paulo, Brazil.

**STATE OF THE ART**

Since 2000, this research group centered its activities in the planning and implementation of innovation habitats, recognizing their importance as tools for local/regional development. These studies were financed by government agencies (regional agency - The State of São Paulo Research Foundation (FAPESP) is one of the main funding agencies for scientific and technological research in Brazil. It is linked to the State of São Paulo's Secretariat for Higher Education – Research in Public Policies Program; national agency – FINEP Research and Projects Financing – The Brazilian Innovation Agency; local government funds – projects financed by medium-size cities government).

At the beginning, the focus was on understanding the business – government – academy (universities and research institutes) relationships in specific sectors, industries and regions. The focus afterwards moved to the study of the formation and management of business incubators and clusters studying, among others, the French clusters models (“*Pôles de Compétitivité*”), the Finland clusters models, the Mediterranean countries clusters models, including the Science & technology Parks models in these regions.

The cumulative experience acquired by this research team enabled the development of a custom made model focused on medium-size cities. The model is based upon working with the public and private sectors, in order to articulate a local innovation system, and prepare the environment for the implementation of Science &Technology Park (STP) projects.

**RESEARCH FOCUS**

This paper contributes to answer the research questions: *“How can regions and/or STPs capitalize on the many benefits of a university culture? How can those interactions/relationships be integrated in to the larger knowledge ecosystem*?”

**METHODOLOGY & FINDINGS**

To answer these questions, the PGT/USP researchers implemented a *research-action methodology*, applied for the case of medium-size cities in Sao Paulo State (Brazil), according to some principles: equilibrium between a desire of change of the local stakeholders and PGT/USP research purposes; a double objective aimed at resolving the problem and producing new knowledge. The first effort of the PGT/USP research group is to build up a common language between stakeholders, in order to deal with the different representations and expectative of each stakeholder, and to transform the problem into clear research questions.

Although it takes time to build up this common language and expectative, it is important to establish partial results and benefits for the stakeholders in order to support the local animation process (visibility). The set up to achieve these objectives includes: workshops with stakeholders and local community; a comprehensive survey about local social-economic & technology-scientific situation (including aspects of environment & social sustainability diagnostic); external scientific expertise mobilization to check the validity of some proposals; design and modeling structures for the local innovation system organization/animation; communication program for the local community acceptance; and participation.

The substantive evidences and results of this effort are: the conception of referential documents for the Innovation System design, including modeling innovation habitats (STP, poles-clusters and others), according to local characteristics and articulation; publication of academic papers; establishment of local knowledge communities (by using ICT instruments); articulation of international and national cooperation.

This paper presents the conception of the proposed model, and describes the research-action- methodology that was applied. It also presents the results of two concrete experiences of application that validated the model.

**THE PROPOSED MODEL CONCEPTION**

The proposed model is shown in Figure 1. The pre-conception of the local/regional articulation (focus on developing ecosystems that can improve social-environmental economic development for the regions) is conducted by the PGT/USP team, considering the existing research projects and planning. For this kind of articulation, PGT/USP acts by contacting local/regional public, academic and companies players and, if possible, the innovation habitats and initiatives that are being developed. Only after the negotiation/articulation process is well established, does the PGT/USP team help local players to prepare financial support proposals for studies and projects, considering the local/regional innovation system interests. The PGT/USP experience, in this matter, points to the request of public financial support, in case there are no specific companies interested, due to the very early stage of the process.

Taking into account the success of the pre-conception step, the conceptual model consists of five steps.

The first step is the *diagnostic of the local innovation system, culture & infrastructure,* comprising the following components: general indicators (infrastructure, history and culture); socio-economic indicators; science & technology indicators; characterization of the economic potential, vocation and activity; and, analysis of the innovation system and its financing. The outputs of this step are: (i) A reference report outlining the needs for the development of a local innovation system; (ii) an executive presentation to convey the report to public and private parties; and (iii) a proposal for PGT/USP researchers’ participation in this process (including a draft proposal for a cooperation agreement).

The second step aims at intensifying the relationship with local public authorities in order to start the *animation process*, by means of attracting the attention of all public local/regional power levels. Initiatives to promote the idea and provide visibility include: (i) a dissemination seminar for local government; (ii) a public hearing to increase the general acceptance; (iii) a workshop with the private sector, including companies and trade local trade associations, dimensioned according to the characteristics of the specific business community; and (iv) a seminar to disseminate good practices, with the possible participation of speakers from abroad. The products of this step are: (i) project reference documents; (ii) letters of support from both public and private sectors entities; and, (iii) MOUs formalizing the collaboration between PGT/USP and the municipality.

The third step is the *innovation system development* *and articulation*, at the end of which the following products are generated: (i) a characterization of the innovation system structure, taking into account the local conditions, and depicting the pole paragon and its relevant clusters or networks); (ii) the diagnosed gaps in the local innovation system; (iii) a proposed way to articulate the scientific-technological collaboration of universities and research institutes; (iv) the knowledge management system; and, (v) a proposed way to integrate business enterprises into the local innovation system.

GOVERNMENT, CLUSTERS OR OTHER DEMANDS

PGT/USP RESEARCH THEME PROPOSAL

LOCAL STAKEHOLDERS/

PLAYERS DEMAND

Contacting local public, academic and companies’ players;

Negotiation/articulation process;

Preparing proposals for financial support.

PRELIMINARY CONCEPTION

LOCAL ARTICULATION

NO

Confirmed the interest and viability of the project? Is there financial support?

Infrastructure, history & culture indicators;

Social-economic indicators;

Economic potential, vocation & activity characterization;

Innovation System (IS) analysis and its financing.

OUTPUTS:

Reference report;

Executive presentation;

PGT/USP formal proposal (draft for cooperation agreement).

YES

STEP 1-DIAGNOSIS LOCAL INNOV. SYSTEM, CULTURE & INFRASTRUCTURE

OUTPUTS:

Project reference documents;

Letters of support;

Formalizing the collaboration.

Dissemination seminars for local government;

Public hearing to increase general acceptance;

Workshops private sector;

Good practices dissemination seminar.

STEP 2-ANIMATION PROCESS (communication tools)

Characterization & design;

Diagnosed gaps in local IS;

Articulation model for Scientific & Technological collaboration;

Knowledge management system proposal;

Integration of companies into local IS.

OUTPUTS:

Reference reports and proposal.

STEP 3-INNOVATION SYSTEM (IS) DEVELOPMENT AND ARTICULATION

OUTPUT:

Conceptual model;

Conceptual model presentation seminar.

STEP 4-CONCEPTUAL PROJECT OF THE SCIENCE & TECHNOLOGY PARK

STEP 5-technical assistance for project implementation

PROJECT IMPLEMENTATION

Figure 1: PGT/USP – The proposed model conception

The fourth step is the *conceptual project of the technology park*, in case the previous studies show that there is a favorable environment and conditions for the implementation of such a platform in the targeted region. The output is a Conceptual Model of the Technology Park.

The fifth step consists in *technical assistance for project implementation*. The group experience stresses the importance of this step, as a “black hole” period usually appears after the technology park concept was established. This may hinder the beginning of effective implementation. Therefore, a permanent action of PGT/USP research group has turned out as necessary to stimulate and monitor the project development

In the second part of this paper, the two most recent research-action experiences conducted by PGT/USP research group in the State of São Paulo are exposed: the *Competitive and Innovation Pole and Technology Park of Sorocaba* and the preliminary activities to enhance the *Guarulhos Pole*. These two cities are medium-size according to the Brazilian taxonomy.

**THE MEDIUM SIZE CITIES CHARACTERIZATION: SOROCABA AND GUARULHOS – SAO PAULO STATE – BRAZIL**

**Sorocaba** is a southeastern Brazilian city and one of the largest cities in the Sao Paulo State. The City has a population of approximately 0.6 million residents. Sorocaba began as a village settlement in 1654 and was officially granted city status in 1842. The State of Sao Paulo itself is one of the most prosperous in Brazil. Home to a number of industries (near 1,500 companies, some of them multinational companies, responsible for 5.6% of the State of Sao Paulo’s GDP), it has rich farmlands, a developed transportation infrastructure and an abundance of skilled labor. Sorocaba’s industry produces iron and steel products, chemicals, farming equipment and machinery, textiles, cement, motor vehicle spares and electro-electronic devices. Sorocaba has a well developed road network linking it to other cities and towns in Sao Paulo State. There is also a rail link between the city and Sao Paulo that goes as far as Argentina, carrying mainly export goods. The city is also served by an airport. The knowledge/academic/technology infrastructure includes public and private universities and colleges (ten universities and colleges; over 50 courses, mainly on social applied sciences, with some traditional technology courses, that support the local industry activities and employees formation). According to the studies and diagnosis carried out by the research team, the city was characterized by a non-articulated Local Innovation System (LIS), although it has all the necessary components for the LIS organization. The articulation of the Sorocaba’s innovation system was the focus of the research group efforts, as regional/local development ensues when competitiveness occurs in regions where localized capabilities exist, such as organized knowledge-technology-innovation structures. This is in accordance with the literature on innovation systems, that provides substantial description of innovation, learning and economic regional performance.

**Guarulhos**, situated in the metropolitan region of Sao Paulo, has 1.3 million inhabitants. It is the second largest city GDP in the State of Sao Paulo. Guarulhos houses Brazil’s largest passenger and cargo air terminal and plays an important role in the country’s economy. With flights to 117 cities in 26 countries, the airport averages 475 takeoffs and landings per day, handling 17 million passengers a year. The city is one of Latin America’s leading manufacturing centers. Some 2,300 factories create over 90,000 jobs in a wide range of sectors including general engineering, electrical products, rubber, plastics, chemicals, pharmaceuticals and foodstuffs. Local factories supply the domestic market and export to 126 countries. An inland dry-port, general warehousing and customs-bonded freight terminals are available, offering cargo security and speed up import-export processing. The city enjoys a strategic location close to Brazil’s largest cities (São Paulo, Rio de Janeiro and Belo Horizonte). It sits astride two of the country’s most important land routes, the *Presidente Dutra* and *Fernao Dias* highways, interconnected with federal highways linking to other major Brazilian markets. IN spite of its favorable economic situation, Guarulhos has social and environmental sustainability problems and its knowledge-academic formation ecosystem is badly articulated with regard to the local companies and the society needs. Therefore, the local municipality decided to insert into the government programs the development of an innovation system and innovation habitats, in order to stimulate the socio-environmental development of the city. Due to its previous experience with other municipalities, PGT/USP was chosen to aid the local government to formulate the conceptual model for the local innovation system and the future STP.

**The Innovation System in Sorocaba city**

The application of the PGT/USP model for the case of Sorocaba City points to the implementation of an articulated Innovation System. After analyzing the scientific-technological and economic potential of the city, the conclusion of the diagnosis step was the absence of successful experiences of links between local companies and academic organizations. The assessment of alignment between the main economic local activities and the formation courses and the academic research, found new opportunities to integrate these players in applied research projects and courses. Considering these and other results from the studies conducted by PGT/USP (steps one and two of the model), a proposal for organizing the local Innovation System was developed. Figure 2 shows the major components of the Local Innovation System. The core of the articulation of the Sorocaba’s Innovation System are the Innovation Forum, the Innovation Agency (Innova Sorocaba) and the Sorocaba Development and Innovation Pole (PODI), responsible for catching up the ideas and proposals for local government public policies formulation. The Innovation Forum proposals are supported by strategic information generated by the components of the local Innovation System, organized in an Information System for Innovation (managed by PODI, in process to be transformed in an internet-based Portal).

The situation of this PGT/USP project is: the core components of the Sorocaba’s Innovation System are implemented (PODI, Inova Sorocaba and Innovation Forum). The conceptual model of the Sorocaba Technology Park and the conception of the Coordination of the Incubators Centers (CECIS – with the first incubator center already in operation) were developed. The implementation of the first stage of the Sorocaba Technology Park is planned for 2010.

**The Guarulhos City Innovation Habitat Project**

This is a very different experience for the PGT/USP team. Guarulhos is as complex challenge, due to the fact that the local/regional knowledge, technology and innovation system is disarticulated. After discussions with the municipality and other local players, including the Development Agency (AGENDE), regional associations and universities, colleges and public technology centers, it was decided that the scope of the project should be the conception of an innovation habitat. Therefore, PGT/USP’s research project, in this case, aims at proposing an innovation habitat conceptual model for Guarulhos as a public policy instrument that contributes to the local sustainable development. The research methodology comprises an analysis of the national and international experiences about innovation habitats in high dense urban regions, selecting the best practices, and a case study considered adequate for local condition diagnosis; the research criteria are the social-economic, political-cultural and scientific-technological dimensions. The project team also intends to promote the knowledge dissemination, capacitating the beneficiary entity and partner staff and to assist local leadership formation. As financing supported is needed for this project, PGT/USP’s team has submitted a project to FAPESP – The State of São Paulo Research Foundation (this is one of the main funding agencies for scientific and technological research in the country; it is linked to the State of São Paulo's Secretariat for Higher Education). The first stage of the project approved by FAPESP is completed. PGT/USP is waiting for the approval of the second stage proposal. Some of the results of the first stage are:

1. The core subjects and study groups articulation. Based on the local main economic activities and companies characteristics & needs, the following study groups among the local players were established, focusing on the conception of an innovation habitat: logistics, pharmaceuticals, metal-mechanics, Technical Schools and Internet-based Knowledge Portal.
2. A thorough revision of the innovation systems and innovation habitats theory, including science & technology parks, clusters and poles. The conclusion was that the French competitiveness poles experience is the most significant for the Guarulhos case.
3. Training and capacitating activities. Considering that the first effort of PGT/USP’s research group is to build up a common language between stakeholders in order to deal with the different representations and expectative of each local player, four training and capacitating events were held, consisting of workshops and presentations on the following themes: innovation system and innovation habitat theory; governance in innovation system; technology and innovation management; knowledge management; international and national experiences on innovation habitat; information technology and internet-based portal.
4. The preliminary vocation study of the Guarulhos city.

**The project documentation and intellectual property rights (IPRs)**

In all cases PGT/USP organizes the project documentation. The documents are reproduced for the project stakeholders and disseminated by seminar events. All the intellectual property rights are previous negotiated. As PGT/USP is a research center that preserve academic interests, most of times the partial or final results of the projects are published.

It is interesting, at this point, to comment the dissemination of this kind of research project, focusing on the IPRs. The trade-off between the university culture and policies and the vision of academic entrepreneurship or research results commercialization is one of the most important difficulties to establish the researchers’ cooperation in such projects. Therefore, the existence of interdisciplinary research centers such as PGT/USP becomes a relevant tool to foster the innovation culture in the university.

**Forms of interaction of PGT/USP**

The interaction between PGT/USP’s research group and the local players and stakeholders has been discussed in the two case studies. An additional aspect that needs analysis is the form of interaction inside PGT/USP. The researchers have been interacting in different ways along the more than two decades of existence of this Center. In the innovation habitats theme, this interaction combines jointly advising master and doctoral students, as well as research works itself. The academic activities/outputs are: jointly taught courses, doctoral and master’s dissertations and joint academic papers. The search for grants has been successful, considering that since the beginning of this kind of research group effort on innovation habitat theme (in 2000) the PGT/USP has gotten four research grants in the major Brazilian funding agencies that support scientific and technological research

Sorocaba Development and Innovation Pole (PODI)

Incubators Centers Coordination (CECIS)

Innovation Agency

(INOVA Sorocaba)

Sorocaba

Technology Park

Innovation Habitat

**Innovation Forum**

(Sorocaba Municipality, Innovation Agency Council, Development and Innovation Pole Council, Chambers, invited members)

**Public Policies**

Government Actions

**Information System for Innovation**

Figure 2: Innovation System for Sorocaba city and region

**CONTRIBUTIONS**

The paper reinforces the value of the entrepreneurial university model and provides a new approach to render concrete its potential contribution to society at large. The focus is the unique role of interdisciplinary centers focused on innovation and development to catalyze the densification of local and regional innovation systems, including science and technology parks as platforms of economic development. This role of the university is made possible by the high credibility acquired among the different stakeholders – government institutions and agencies, the private sector, S&T entities, NGOs, the press and others. This high level of confidence is a consequence of the stakeholders’ perception of: (i) the relevance of the specific bodies of knowledge dealt by centers such as PGT/USP to provide a solid roadmap for a city or region aspiring to take part in the knowledge-based economy; and (ii) the contributive and non-arrogant attitude the research team, leveraged by the recognition that a well-respected university is a useful ‘demilitarized area’, were the different views prevailing among the different actors are taken into account without being tainted by the strong feelings that usually arise in local politics. On the other hand, this involvement is highly beneficial to the academic activity, as the graduate students involved acquire simultaneously theoretical knowledge and practical skills. A positive side effect is the mutual acquaintance between the city/region stakeholders and the students, which enable these to find professional opportunities in the projects and institutions proposed by the research team that enhance their training (this has happened in the cases dealt by PGT/USP). The paper also presents a structured stepwise method, validated in real setting, which can be helpful to universities and colleges interested in being an active partner of the development of their regions. This enhances the larger ecosystem, and enables a win-win process that facilitates academic researchers to play a proactive role in the local/regional development process.

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