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TECHNOPOLIS AS A HABITAT FOR INNOVATION: THE LONDRINA TECHNOPOLIS PROGRAM

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ABSTRACT

This paper aims at describing the actions undertaken by the Londrina Technopolis Program since the year 2000 and perspectives for its future performance. This program consists of a set of actions devised to promote the technological, economic and social development of the region including more than 30 municipalities in the surroundings of Londrina in a 10-year time horizon. The technopolis program is managed by ADETEC, a 10 years old NGO which has a recognized role as a third sector institution with the objective of promoting regional development, via partnerships with other institutions, agents and promoters of technological innovation.

INTRODUCTION

The objective of this paper is to describe, in a broad perspective, the conception and the development of the activities of the Londrina Technopolis Program. The objectives of the Program are: (i) to structure a regional innovation system recognized worldwide; and (ii) to set up the foundations of a technological park as part of this innovation habitat.

The importance given to knowledge and technological innovation by contemporary society has led governments of many countries to set up policies directed at the valorisation of these two factors to induce development. This approach, also adopted by the Brazilian government, is leading to an increasing awareness by Brazilian society on the strategic role that technological innovation can play in the full development of the country. Several mechanisms have been proposed aiming at the insertion of technological innovation in the productive sector, and amongst the so-called "technopolis" programs. According to ANPROTEC & SEBRAE (2002; p.94) technopolis is an urban articulated system that integrates local and external agents as players in the process of regional technological development based on a sustainable development strategy. It is also defined by Ruiz et al (2001; p. 2) as a region dominated by a remarkable presence of high level technology materialized into the form of research, development and production of goods and high standard services.

In order to provide a new direction for the social and economic development of Northern Paraná, ADETEC (Association for the Technological Development of the Londrina Region) has undertaken a number of progressive actions to foster technological innovation since early 1993. The most proficuous of all these actions was taken in 2000, when the Londrina Technopolis Program started as a project. The first study to support this project was based on an analysis of the supply and demand for specialized technical services in three economic sectors (food processing, information technology, and chemical/pharmaceutical). These sectors were selected taking into account the results of the Industrial Development Plan of Londrina (PDI - 1995/96), which indicated three out thirteen sectors for investment as a function of the potentialities of the region.

It is important to point out that Londrina was one of the most dynamic cities in Brazil from 1930 to 1970, with high economic growth rates based on the combination small farm and coffee cultivation. For about four decades this successful model created a solid rural middle class, fast growth and high investments in the region.

In the 1970s this model was completely modified when coffee cultivation was eradicated because of economic, political, institutional and climatic factors, causing social (loss of 1.5 million inhabitants that migrated to other regions) economic (100 thousand small farms were engulfed by larger ones) and environmental impact (soil erosion, and river silting). The city established itself as a regional service center from 1980 to 2000, especially in the areas of Education, Health, and Commerce. Presently, the city has around 480,000 inhabitants and provides high standards of quality life and communication/ transportation facilities.

Since the 1990s, the public conviction has grown that the region can be more than a regional development pole and, therefore, reach World Class Region levels in the mid-term. This prospective scenario envisages high standards of competitiveness for enterprises at a regional level and a growing number of qualified professionals able to operate sophisticated technological apparatuses, enabling the Londrina region to interact, via partnerships and strategic alliances, with other developed regions worldwide.

In the whole region polarized by Londrina (100 km2) there are R&D providers (universities and research institutions), innovation technology assets (incubators, technology development programs, Information Technology enterprises and development companies) as well as traditional enterprises from around 30 different sectors. An expressive service sector concentrated mainly on education and health is also present in the region in cities other than Londrina. Altogether these assets form a suitable environment for the proliferation and transformation of new ideas into technological innovations. Taking this into account, the Technopolis Program intends to induce technological and economic development to the countryside area of Northern Paraná.

Since 1993, several attempts have been made by ADETEC and its partners to link supply and demand for technological services in the region as to create a fertile environment for a *technological learning and innovation pole*[*]. All these ADETEC's attempts culminated in the conception of the Londrina Technopolis Program in 1998, which began operating in January 2000 and is expected to continue up to 2010, when it should effectively consolidate an innovation system in the region.

ADETEC is a not for profit organization, recognized as a public service by the City of Londrina, the State of Paraná, and federal government with the objective of promoting actions directed at scientific and technological development in the Londrina region. Its mission is to be an integration agent for the economic and social development of Northern Paraná, based on technological development. Founded on October 1993, it ties together public authority, private sector and education, research and development all represented on its Board of Directors and Administrative Council (SENDIN, 2002). Throughout its existence, ADETEC has developed several projects in partnership with other institutions such as FINEP and CNPq (Federal government funding agencies), and Paraná Technology (State agency) together that have played a decisive role in financial support. The other institutional partners, at both local and state levels, are: Paraná Institute of Technology (TECPAR), State University of Londrina (UEL), Paraná Agronomic Institute (IAPAR), Brazilian Enterprise for Agriculture Research (Embrapa), Euvaldo Lodi Institute (IEL/FIEP), Electric Energy Company of Paraná State (COPEL), Londrina Development Agency (CODEL) and Londrina Telecommunication Services Enterprise (Sercomtel).

CONTENT

The central focus of the Technopolis Program is Londrina where the major innovation facilities and enterprises are concentrated, but it is expected that other surrounding cities in the region will gradually join this initiative. Apucarana and Arapongas were the first two to be involved in 2002 as part of a specific project named Extension of the Technopolis Program to the Londrina Neighbor Municipalities (Pólos TIC).

[*] According to GIBSON et al. (1999; p.5), the *learning and innovation pole* is an evolutionary improvement to the concept of technopolis as one that is more attuned to the needs of developing countries.

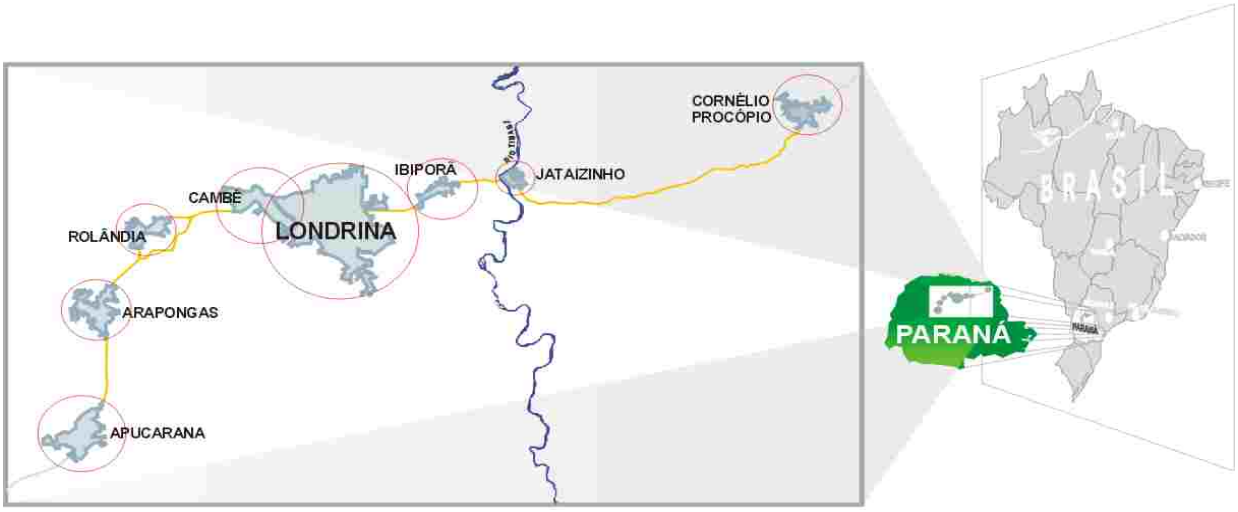

Figure 1: Geografical localization of the Londrina region

Research Approach

According to RUIZ et al. (2001; p.9-19), the methodological approach to carry out the preliminary survey on the three major industrial sectors (food processing, information technology, and chemical/pharmaceutical) consisted of analyzing technological strengths and weaknesses for each of them as it regards to supply and demand of specialized technical services. These three industrial sectors were selected out of thirteen with a *cluster*[**] capacity building according to PDI – Industrial Development Plan (1995/96). The study involved office and field survey and consisted of four steps described as follows:

(i) Literature review and selection of the enterprises
The literature review focused on gathering information on the three industrial sectors studied as well as on national and foreign experiences related to the structuring of local and regional

Figure 1 – Geographic location of the Londrina region

The data basis consisting of around 400 enterprises´ addresses resulted from the compilation of data that were obtained from public organizations at the local and state levels. Contacts with local professionals with expertise in these three sectors were also helpful to select the enterprises´ sample to be interviewed. The sample of enterprises classified by industrial sectors, is presented below in box 1.

Sectors	Number of Companies
Food processing	43
Information technology	49
Chemical / Pharmaceutical	11

[**] According to QUANDT (1998; p.4), *clusters* are built upon the development of relationships that integrate the isolated technological capabilities of institutions, firms and individuals into a collective, territorial asset.

In addition, 13 public and private institutions, including 2 R&D institutions, 2 universities, 5 colleges, 3 technical schools and 2 incubators were also included in the research sample. The sampling procedure had to be "selective" due to lack of available updated enterprises´ addresses and difficulties in identifying the entire population of potential participants.

(ii) Field Survey
It consisted of interviewing 103 selected private enterprises, and 13 public and also private institutions. The major goal of the interviews carried out in the private enterprises was to identify the existing and potential demand for specialized technical services. Semi-structured questionnaires were designed to gather the necessary information. Open-end questionnaires were also designed to survey the existing and potential supply of specialized technical services in universities, R&D institutions, and technical schools.

(iii) Formulation of Prospective Scenarios
Since the technique of formulating scenarios is now recognized as an important tool for technological planning and development, scenarios to envisage possible technology transfer mechanisms to help the structuring of the regional innovation system were built. At least six workshops were carried out with professionals from private enterprises, academia and R&D institutions. Participative methodologies were used in these workshops as creative thinking tools to raise new ideas related to the foreseen future of Londrina as the center of a regional innovation system. Anticipatory scenarios were built for the food processing and the Information Technology sectors. The chemical/pharmaceutical sector was excluded because the field survey results indicated that it does not have the potential for building an innovation cluster. VOYER (1997; p. 2) defines innovation cluster as a regional or urban concentration of firms including manufactures, suppliers and service providers in one or more industrial sectors. These firms are supported by an infrastructure made up of universities and colleges; research institutes, financing institutions, incubators, business services and advanced communications / transportation systems.

(iv) Elaboration of the strategic plan
The strategic plan was prepared after the analysis and collation of all data and information obtained from the field survey and the workshop series altogether. SWOT (Strengths, Weaknesses, Opportunities and Threats) was the methodological approach used to support the data and information analysis and collation for all these industrial sectors. After this, the relevant information obtained from the results of the SWOT analysis were thoroughly examined through the perspective of the priority matrixes approach emphasizing the cross sectional analysis of technological problems versus possible solutions. These possible solutions comprised short-term remediation actions and also research projects to overcome major technological problems of both the food processing and information technology in the mid to term (2002 – 2010).

According to CHIARELLO (1999; P.5), the concept of platform was adapted from PADCT (Brazilian Support Program to Scientific and Technological Development) that defined it as a forum where specific society sectors get together to identify technological problems and constraints affecting the development of a given region, and also to propose actions to correct or provide solutions to such problems. In the context of this paper, platform is a "virtual department" at ADETEC devised to propose and undertake short to mid-term strategic actions to overcome the technological problems affecting the enterprises in the Londrina region.

As a result of the strategic plan, the Londrina Technopolis Program was organized into three Platforms (Information Technology – PLATIN; Agro-industry – PLATALI; and Knowledge - PLATCON) and four supporting areas (Information and Project Support System – SIAP; Marketing

and Communication; Integrated Management System – SGI; and Extension of the Londrina Technopolis Program to Other Neighbor Municipalities – Pólos TIC).

Institutions such as FINEP, CNPq and Paraná Technology have played a decisive role on financing these activities. Other institutions, such as TECPAR, UEL, IAPAR, Embrapa, Euvaldo Lodi Institute, COPEL and CODEL, were also of great importance to the implementation of the Program, action as institutional and technical partners.

The Platforms and its Supporting Services

A brief description of the strengths and problems of the three platforms and the four supporting services is presented as follows:

Information Technology Platform - PLATIN

The information technology sector is not a traditional one in the Londrina region, but it has been growing in importance since the 1970s. Due to its infancy, the sector is still dominated by small enterprises and only a few can be classified as medium-sized companies.

Concerning the supply of academic knowledge, public and private universities and colleges throughout the region offer regular undergraduate, graduate and specialization programs in Computing Science, Electronics and other related areas. Undergraduate and master's programs in Electrical Engineering can also be found at UEL.

A regional extension of the National Program for Software Export – SOFTEX also exists in Londrina since 1996. It is named SOFTEX Northern Paraná Nucleus and it is coordinated by ADETEC. Presently, this Nucleus has 45 associated enterprises in Londrina-Maringá region. In the last 7 years ADETEC, through the SOFTEX Nucleus, has provided several training courses aimed at professional recycling in new information technologies that benefited the majority of its associates.

The region also has two Genesis SOFTEX centers, the extension of the National SOFTEX program in public universities. One is located at UEL (GeNorP) and the other at UEM (Infomar). Both work in the dissemination of entrepreneurship knowledge and strategies in the software area, via the International Technological Incubator (INTUEL) and the Maringá Technological Incubator (Intemar).

One of the major technological problems in the software area is that all the existing competences are dispersed and, therefore, it contributes to make the regional software industry fragile, low scale, and unable to meet complex, large scale demands. Another relevant problem is that the Londrina region has become an exporter of well-trained professionals from Computing Science and related areas to other urban centers, especially Curitiba and São Paulo.

PLATIN – the Information Technology Platform was created to provide solutions to these and other problems. This platform is currently integrated to the REDE TIC PARANÁ (TIC PARANÁ NETWORK), Paraná World Class in Software, and to National SOFTEX PROGRAM. This Platform is structured into three business units, described as follows:

(i) Northern Paraná Software - aims at strengthening the software industry in the region, adopting internationally accepted quality standards and creating competencies to meet the emerging demand for software development projects in Brazil and abroad.

(ii) NUCOM – Software Development for Telecommunications Nucleus - aims at developing a strong regional competence in Telecom, articulating cooperative projects involving technology intensive enterprises and universities.

(iii) FORMACON – Program for Continuous Education – aims at training Engineering and Information Systems students in the technological standards adopted by the software Factory and NUCOM.

Food Processing Platform - PLATALI

The food processing industry is the most important in the region with a diversified industrial base composed by numerous micro and small companies that produce coffee, pasta, maize, and dairy products, to name just a few. At the regional level, this industry has a quite good infrastructure for labor training and specialized technical services supply.

The most important technological problems of this industry are:

- Poor integration among educational, R&D institutions, and the enterprises;
- Existence of just a few mechanisms to support technological innovation related programs such as pre-incubation and incubation;
- Concentration of distribution channels, imposing commercialization constraints to products manufactured in the regional market.

The analysis of the potentials and problems of this sector led to the structuring of PLATALI, with the following objectives:

- Help to organize the food processing enterprises in order to better integrating them with other links of the productive chain;
- Develop entrepreneurship programs with undergraduate, master and doctorate students, professors, and researchers;
- Support pre-incubation innovation programs, involving cooperative projects, supervised traineeships, and technology transfer offices.

Knowledge Platform - PLATCON

Considering that “knowledge”, as it regards to both the diffusion of qualified training courses and the supply of technical services can be seen as a specialized type of business, ADETEC decided to give it the status of a platform. Presently, the area that encompasses Education, R&D activities and technological services supply is responsible for a number of job creations in the region and also it works as an element of attractiveness for important qualified professionals. In the last ten years, the “knowledge area” has shown remarkable growth indexes as a result of a number of factors such as the expansion of Unopar (a local private university), the transformation of Cesulon into University (Unifil), and the installation of two additional private academic institutions – PUC-PR and Metropolitan University.

The philosophy surrounding the Knowledge Platform is that the management of the available knowledge (both tacit and explicit) is strategic for the implementation of the Technopolis Program in the mid-term and also decisive for the development of an entrepreneurial culture among professors, researchers, technicians and students.

The major problems identified in this area are:

- The number of undergraduate courses available in technological areas (e.g. Engineering) is, by and large, still small and just one public university (UEL) offers graduate courses (master's level) in Civil Engineering, Electrical Engineering and Computing Science;
- The dissemination of the entrepreneurship culture in the academic environment is in its early stages, and sensitizing the school population (1st and 2nd grade) in this issue still has a long run to go.

Based on its own experience and an in-depth analysis of the all these problems, ADETEC has organized PLATCON, with the following objectives:

- Integrate academia, R&D institutions and other technological services suppliers in areas that are strategic for regional development;
- Generate a consistent data basis on both the scientific and technological competences at a regional level;
- Develop approximation and integration mechanisms between academia, R&D institutions and the productive sector, via cooperative projects and supervised traineeships;
- Sensitize the community on the opportunities opened by the Knowledge Society, through lectures and courses, organization of science fairs, and science museum;
- Disseminate the entrepreneurship culture in grade school and also in undergraduate and graduate university courses;
- Foster the development of entrepreneurial spin-off programs by offering in company entrepreneurship courses;
- Create local competences to provide support on intellectual property rights documentation.

Concerning the support services to the Technopolis Program, it worth awhile providing a brief description of four activities, as follows:

(i) Information and Project Support System – SIAP

One of most serious problems faced by the Londrina Technopolis was lack of up-to-date, reliable and accessible information on a regional scale. Information on the region is dispersed in several partial data basis, out-of-date and frequently with restricted public access. The lack of a centralized, current and accessible data basis makes project development far more expensive also it imposes an enormous extra work in data collection. This situation also hinders the flow of information on grants availability for project development resulting in low applications by R&D institutions and enterprises. All of these problems led to the creation of SIAP, with the following objectives:

- Develop an integrated data basis on the region, and make it available on the Internet;
- Meet the Londrina Technpolis Program demands in terms of elaboration new project proposals.

Presently, the SIAP´s activities are organized into five blocks: Regional Socioeconomic Profile; Industrial Sectors Studies; "knowledge Map"; and Geoprocessing as a Supporting Tool for Project Development.

(ii) Marketing and Communication

ADETEC carries out a series of activities in this area to sensitize and engage the population and the opinion formers in the effort to structure a regional innovation system. These activities have included Londrina International Technology Event; Innovation Annual Award; Ruraltech – International Exhibition on Agribusiness Technology; CONTTEIN – Technology, Telecommunications and Information Technology Congress; Forum of the Future; and the National Software Award for Telecommunication. In addition, this institution has also

published the ADETEC News (newsletter) on a weekly basis and presented the Tecnopolis TV show on a daily basis.

(iii) Management Integrated System - SGI

The SGI is a system developed in JAVA language that allows the management of both technical and financial activities of the Londrina Technopolis Program through the combination of intranet and internet technologies.

(iv) Extension of the Londrina Technopolis Program to Other Neighbor Municipalities – Pólos TIC

The objective of this project is to extend the Technopolis Program to other cities of the region in partnership with city halls, universities, and colleges. The actions currently underway intend to improve the enterprises know-how on the use of new information technology tools.

CONCLUSION

This item describes the major results of the Tecnopolis Program's platforms and support services.

The year 2002 was very special to ADETEC due to an expressive financial support received from FINEP that allowed the structuring of both a high-qualified staff and the accomplishment of seven projects altogether. This thrust also enabled ADETEC to be a countrywide respected institution in present S&T, I scenario as it concerns to the heading of an important Technopolis Program. In this regard, one of its remarkable accomplishments was the recognition by ANPROTEC (Association for Promotion of Incubators, Technological Parks, and Technopolis) of the Londrina Program as a reference model nationwide.

The most important results of PLATIN – Information Technology Platform in 2002 refers to strategic alliances with Rational Alliance Software Corporation, Cisco Network Academy, Oracle Partner Network, The Center of Technological Development of Campinas, European Institute Software, Caché – Intersystems, and Borland. Among the other relevant results accomplished by this platform are the following:

- Donation of R$ 26 million (Reais) in tools of software development to universities at a regional level;
- Promotion of 2 international seminars on Telecommunication;
- Technical support to 530 companies of the Londrina region as it regards to project development and implementation;
- Training of around 1500 professionals;
- Establishment of 7 partnerships with local enterprises in order to disseminate new information technologies.

As it concerns to PLATALI - the Food Processing Platform, presently, it is developing three cooperative projects; the first one involves UEL and three enterprises that manufacture maize products; the second one involves Embrapa – Brazilian Enterprise for Agricultural Research and three small companies that use soybean as a major human nutrition component is their products. The third one is being developed in the context of a partnership between UEL and Dixie Toga (private enterprise). The objective of this project is to develop an environmentally friend plastic film that degrade itself in a short period of time.

Another current activity of this platform is the organization of agro-industry related events. The most important is Ruraltech, a specialized annual event in agricultural technology that takes place in April, since 1998, in the context of the Londrina´s International Farming Fair. In the last 5 years, Ruraltech has granted 28 awards for either innovative agro-industrial products or processes coming out from R&D projects carried out countrywide.

At it regard to PLATCON – Knowledge Platform, its major accomplishment in the year 2002 was the heading of the Marathon of Entrepreneurship, an annual event to support entrepreneurship initiatives at a regional level. This platform has also provided courses and lectures on entrepreneurship related issues to over than 1,000 people in the Londrina region.

REFERENCES

ANPROTEC & SEBRAE – Associação Nacional de Entidades Promotoras de Empreendimentos de Tecnologias Avançadas & Serviço Brasileiro de Apoio `a Micro e Pequenas Empresas. *Glossário dinâmico de termos na área de tecnópolis, parques tecnológicos e incubadoras de empresas.* Coordenação FIATES, J.E.A., et. al. Brasília, 2002, 121 p.

CHIARELLO, M.D. *Rodadas tecnológicas: um programa para estimular a conectividade entre os setores público e privado no Paraná.* Monografia apresentada ao Curso de Gestores em Ciência e Tecnologia. Programa Paraná Novos Talentos. ISAD & SETI, 1999.

GIBSON, D. V. et. al. Incubating learning and innovation poles in developing regions worldwide. Technology and Innovation Management: Setting the Pace for the 3rd Millennium. *Portland International Conference on Management of Engineering and Technology.* Portland, Oregon, July 25-29, 1999.

PASSOS, C.A.K. Sistemas locais de inovação: O caso do Paraná, in CASSIOPLATO, J.E & LASTRES, H.M.M. (Editores) *Globalização & inovação localizada – Experiências de sistemas locais no Mercosul.* Brasília: IBICT/MCT, 1999. 799p.

QUANDT, C. *Developing innovation networks for technology-based clusters: The role of information and communication technologies.* In: Workshop Techno-Regions: Science, Technology and Regional Development – Past, Present and Future Challenges. Rio de Janeiro, June 8-12, 1998, September, 16, 1999 http://technoregions.mse.jhu.edu/Quandt.pdf.

RUIZ, M.S., et al. *Núcleo de referência em tecnópolis: plano estratégico da Associação de Desenvolvimento Tecnológico de Londrina* – ADETEC. Londrina: ADETEC, 2002, 14p (not. Published).

RUIZ, M.S, et. al. – *Os segmentos econômicos de Londrina e região: análise das potencialidades e problemas visando a estruturação de um Pólo de Inovação Tecnológica.* Londrina: ADETEC, 2001. 234p.

RUIZ, M.S., et al. *An analysis of the supply and demand of specialized technical services in the Londrina region envisaging the strengthening of the technological competences and structuring a regional innovation system.* In: 4th International Conference on Technology and Innovation. Curitiba, Brazil, 28-31, August, 2000 http://in3.dem.ist.utl.pt/ downloads/cur2000/papers/ S30P04.PDF.

SENDIN, P. V. *O papel do terceiro setor na definição de arranjos locais de inovação: o caso da ADETEC.* In Anais do XXII Simpósio de Gestão da Inovação Tecnológica. Salvador, Bahia, novembro de 2002. 15p.

VOYER, R. *Emerging high-technology industrial clusters in Brazil, Índia, Malaysia and South África.* Paper prepared for IDRC, 1997a.

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