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Implementation of Technology Parks for the Eradication of Poverty in Emerging Countries: A Brazilian case

Roundtable 4

STPs at different economic and social stages

Author:

Antonio Luis Aulicino (alaulicino@idsust.com.br)

Co-Author:

Liege Mariel Petroni

IDS – Institute for Sustainable Development, Brazil

Implementation of Technology Parks for the Eradication of Poverty in Emerging Countries: A Brazilian case

Executive Summary

The trend of establishing Technology Parks in developing countries is associated with the third generation, the economic process and technological development in emerging countries, which means to set up a Tech Park where there are already universities, industrial conglomerates and all the support and infrastructure.

In Brazil this is how the establishment of Tech Parks occurs - in developed cities that have universities, large enterprises, such as power plants, industrial complexes and resources. Thus, the tendency of poor municipalities is to disappear.

The article aims to show the importance of establishing Technology Parks in poor municipalities, using the Ribeirão Branco case, a poor region in the Southwest of the São Paulo state, identified during the prospective process. The bureaucratic procedure to establish a technology park in a poor municipality is the same as in rich ones. However, public policies should encourage and provide resources for Tech Parks in poor regions.

1. INTRODUCTION

The trend of establishing Technology Parks in developing countries is associated with what was called 3rd Generation Tech Parks, i.e., the accumulated experiences of 1st and 2nd generation Tech Parks, according to ANPROTEC (2008)[1], and is associated with the process of economic and technological development in emerging countries, and occurs where there are already universities, development or deployment of large industrial conglomerates and all the support and infrastructure for this deployment. This process is found in developing countries, such as: Taiwan, Singapore, South Korea and Brazil itself.

In Brazil, the Technology Parks started from the creation of the CNPq (National Council of Scientific and Technological Development) Program in 1984 to support such initiatives, according to ABID and ANPROTEC (2008, p.8)[2]. The idea of Technology Parks regained strength from the year 2000, as an alternative to promoting technological, economic and social development, and having currently 74 (seventy four) projects, including initiatives in the operation, implementation and project phases, according to ANPROTEC (2008)[1].

When analyzing information on HDI, from PNUD (2000)[3], of GDP per capita, from IBGE (2012)[4], and the study on Technology Parks prepared by ABID and ANPROTEC (2008)[2], it is perceived that the development of Technology Parks in Brazil occurs in municipalities whose HDI is higher than 0.701, and the GDP per capita is higher than R$ 5,000.00 (five thousand reais), and the concentration of 56 of these 74 Parks, range from R$ 10,000.00 (ten thousand reais) to R$ 30,000.00 (thirty thousand reais), being located in more developed regions, which already have Federal Universities and conglomerates of large companies such as hydroelectric plants, industrial plants and implementation support. This causes poor regions to not develop and remain increasingly excluded, both regarding education and the improvement of income generation.

The Technology Park is an organization whose goal is to contribute to the prosperity and development of the community, promoting a culture of innovation, cooperative projects and technical and scientific institutions which are associated, according to IASP (2002)[5], and, understanding that the prospective regional planning process is a long-term horizon, the development of cities, regions, states and countries, or specific issues that require a reflection of society to build a strategic vision of the future together, according to GODET (2001)[6].

The objectives of this paper are to: a) demonstrate the need to develop a Technology Park project and its implementation as a result of the prospective process diagnosis in Ribeirão Branco, which has the third lowest HDI in the State of São Paulo and b) demonstrate the importance of the establishment of Technology Parks in poor regions of Brazil.

The methodology used is the action research, which shows the summary of the regional prospective process, how the involvement and o appropriation society representatives of Ribeirão Branco occurred, their contribution and the needs that were diagnosed. Among the needs identified is the Technology Park. In addition, the article discusses the process of analyzing the strategic situation, which was conducted in a participatory manner; and, the preparation of the Strategic Map of the Technology Park with several steps and actions that must be performed for its implementation.

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[1] ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Portifólio de Parques Tecnológicos no Brasil*. São Paulo: ANPROTEC, 2008.

[2] ABID, Agência Brasileira de Desenvolvimento Industrial e ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Parques Tecnológicos no Brasil: Estudo, Análise Proposições, 2008*. Disponível em: http://www.abdi.com.br/Estudo/Parques%20Tecnol%C3%B3gicos%20-%20Estudo%20an%C3%A1lises%20e%20Proposi%C3%A7%C3%B5es.pdf. Acesso em: 20/10/2010.

[3] PNUD, Programa das Nações Unidas para o Desenvolvimento, *IDH – Índice de Desenvolvimento Humano dos Municípios Brasileiros, 2000*. Disponível em: http://www.pnud.org.br/atlas/ranking/IDH-M%2091%2000%20Ranking%20decrescente%20(pelos%20dados%20de%202000).htm. Acesso em: 20/01/2012.

[4] IBGE, Instituto Brasileiro de Geografia e Estatística. *Produto Interno Bruto dos Municípios: 2005 -2009*. Disponível em: http://www.ibge.gov.br/home/download/estatistica.shtm. Acesso em: 12/01/2012.

[5] IASP, International Association Science Park. *SCIENCE PARK (IASP Official definition)*, 6 February 2002. Disponível em: http://www.iasp.ws/publico/index.jsp?enl=2. Acesso em: 20/10/2011.

[6] GODET, M. *Manuel de prospective stratégique, tome 2: l'art et la méthode*. Dunod, Paris, 2001.

2. THEORETICAL BACKGROUND

2.1. Technology Parks

The first Science and Technology Park was created on the campus of Stanford University in the 1950s, which transformed one of the poorest regions of the United States in the Silicon Valley - a global center for technology, finance, education and research, according to UNESCO (2011)[7].

The definition of a Technology Park, according to IASP (2002)[8], and amended by the authors, is an organization managed by specialized professionals, whose goal is to increase wealth and welfare of their community, by promoting a culture of innovation and collaboration, of the projects and the technical and scientific institutions to which they are associated.

To facilitate the attainment of these objectives the Technology Park manages and promotes the flow of knowledge and technology amongst universities, R&D institutes, companies and markets, facilitates the creation and growth of innovation-based companies through incubation and *"spin-offs"*.

From this definition, a first and important conclusion can be inferred, according to SANZ (2003)[9]: Science and Technology Parks are tools to create value and have a social proposition.

The functions of the Technology Park are described below according to ABID and ANPROTEC (2008, p.19)[10]:

- environment that integrates academia and the business sector, effectively allowing an approximation of the generating companies with the centers of knowledge;
- space with infrastructure and professional service, provided with necessary conditions to allow the development of projects;
- environment of innovation that brings together companies capable of forming competitive and innovative clusters;
- development that contributes to the planning and guidance of urban and regional growth integrating other infrastructure projects;
- reference to economic, social, environmental and technological development, through initiatives that are able to meet the challenges of regional development with relevant scale geared to meet the demands of employment and income generation;
- therefore, the Technology Park is a great platform to promote the development of regions and sectors, establishing differentiated opportunities for guiding the growth process.

For The Technology Park to succeed according to STEINER, CASSIM and ROBAZZI (2010)[11], it needs:

- the commitment of municipal, state and federal governments, business sector, universities and research institutes;
- the perspective that the establishment of the park falls within the scope of programs and strategic actions of regional and local development, and
- the need for definition technological segments in which the park can act and be competitive.

According to the study by ABID and ANPROTEC (2008, p.12-13)[12], three major types of Technology Parks featuring "generations" were identified , according to the time they were predominant and the elements that made them unique. Here follows the description of each of the

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[7] UNESCO. *Science Policy and Capacity-Building: Concept and Definition*. Disponível em: http://www.unesco.org/new/en/natural-sciences/science-technology/university-industry-partnerships/science-technology-park-governance/concept-and-definition/, acessado em 24/11/2011.

[8] IASP, International Association Science Park. *SCIENCE PARK (IASP Official definition)*, 6 February 2002. Disponível em: http://www.iasp.ws/publico/index.jsp?enl=2. Acesso em: 20/10/2011.

[9] SANZ, Luis. *Science And Technology Parks: Access Doors To The Knowledge Economy For Regions And Cities*. Isfahan, May 2003. Disponível em: http://www.techpark.ir/files/pdf/150/14.pdf. Acessado em 24/11/2011

[10] ABID, Agência Brasileira de Desenvolvimento Industrial e ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Parques Tecnológicos no Brasil: Estudo, Análise Proposições, 2008*. Disponível em: http://www.abdi.com.br/Estudo/Parques%20Tecnol%C3%B3gicos%20-%20Estudo%20an%C3%A1lises%20e%20Proposi%C3%A7%C3%B5es.pdf. Acesso em: 20/10/2010.

[11] STEINER, João E., CASSIM, Marisa B. e ROBAZZI, Antonio C. *Parques Tecnológicos: Ambientes de Inovação*. Instituto de Estudos Avançados da Universidade São Paulo – USP, São Paulo. Disponível em: http://www.iea.usp.br/iea/textos/steinercassimrobazziparquestec.pdf. Acesso em: 20/10/2010.

[12] ABID, Agência Brasileira de Desenvolvimento Industrial e ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Parques Tecnológicos no Brasil: Estudo, Análise Proposições, 2008*. Disponível em: http://www.abdi.com.br/Estudo/Parques%20Tecnol%C3%B3gicos%20-%20Estudo%20an%C3%A1lises%20e%20Proposi%C3%A7%C3%B5es.pdf. Acesso em: 20/10/2010.

generations: a) 1st Generation Tech Parks – Pioneer Tech Parks; b) 2nd Generation Tech Parks – Follower Parks; e c) 3rd Generation Tech Parks – Structuring Parks.

2.2. Status of Technology Parks in Brazil

The Technology Parks in Brazil began with the creation of the CNPq Program in 1984. Business incubators in Brazil occurred in the first draft Technology Parks, due to the lack of a culture focused on innovation and the low number of innovative enterprises existing at the time, according to ABID and ANPROTEC (2008, p.8)[12]. This movement has increased rapidly and today there are more than 400 (four hundred) incubators throughout the country, with more than 6,000 (six thousand) companies generated from business incubators, universities and research centers.

The idea of Technology Parks regained strength from the year 2000, as an alternative to promoting technological, economic and social development, today there are currently about 74 (seventy four) parks, including initiatives in the operation, implementation and project phases.

2.2.1. Survey of Brazilian Technology Parks

The survey carried out by ANPROTEC (2008)[13], showed that Brazil had seventy-four Tech Parks scattered across its territory. Phases of Technology Parks were distributed in operation, implementing and project, and the 74 Parks by phase, as shown in figure 1:
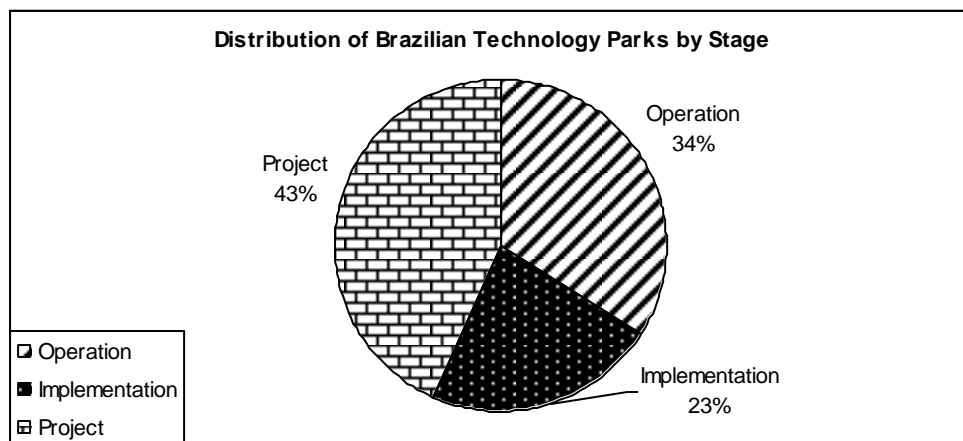

Figure 1: Distribution of Brazilian Technology Parks by Stage
Source: ANPROTEC (2008, p.6) [13]

Figure 2 shows the distribution by phase of Technology Parks and Brazilian Region. It appears that the South and Southeast regions have more Technology Parks in operation. The Central-West and North regions do not have Technology Parks in operation. The Southeast region has the highest number of Technology Parks in the phase of implementation and the highest number of projects for Technology Parks. The North and Northeast regions have the lowest number of implementation of parks.
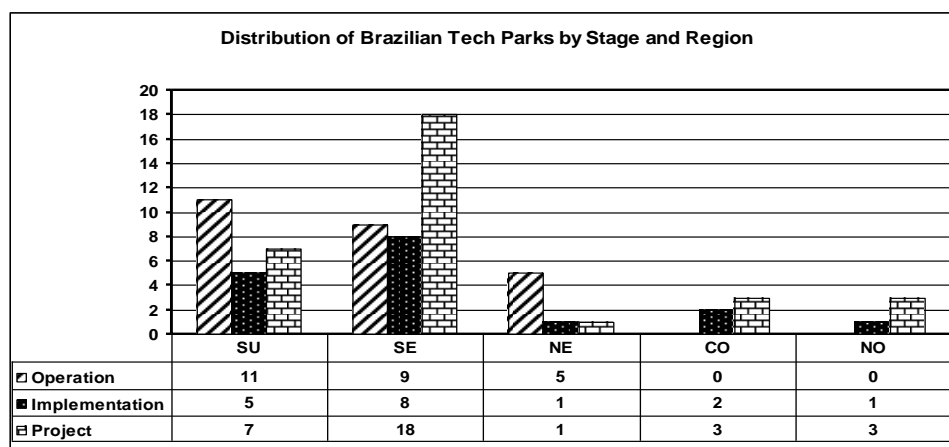

	SU	SE	NE	CO	NO
Operation	11	9	5	0	0
Implementation	5	8	1	2	1
Project	7	18	1	3	3

Figure 2: Distribution of Brazilian Tech Parks by Stage and Region

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[13] ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Portifólio de Parques Tecnológicos no Brasil*. São Paulo: ANPROTEC, 2008.

Source: ANPROTEC (2008, p.8-11)[14]

2.3. HDI and GDP per capita of Brazilian Municipalities

The use of the Human Development Index (HDI) and Gross Domestic Product (GDP) per capita of the municipalities shows their stage of development in comparison with other cities. This way, it is possible to have an idea of the needs of the municipality in planning its development.

2.3.1. HDI for Brazilian Municipalities

The Human Development Index (HDI) appears at the United Nations Development Programme (UNDP/PNUD) and the Human Development Report (HDR). According to PNUD (2012)[15], the objective of preparing the Human Development Index is to provide a counterpoint to another widely used indicator, the Gross Domestic Product (GDP) per capita, which considers only the economic dimension of development. The HDI is intended as a general measure, synthetic, of human development. It does not cover all aspects of development and it is not a representation of "happiness" of people, nor does it indicate "the best place to live in the world."

Besides considering the GDP per capita, after correcting it by the purchasing power in the currency of each country, according to the PNUD (2012)[15], the HDI also considers two other components: longevity and education. To assess the longevity, the indicator uses figures of life expectancy at birth. The item is measured by education level of illiteracy and the rate of student enrollment at all levels of education. Income is measured by GDP per capita in PPP in U.S. dollars (purchasing power parity, which eliminates the cost of living differences between countries). These three dimensions are equally important in the index, which ranges from zero to one. There is, at PNUD, an electronic database with socioeconomic information of 5,507 Brazilian municipalities, data available at PNUD in 2000. To better observe the HDI of municipalities we prepared a graph showing the frequency distribution of municipalities by HDI.
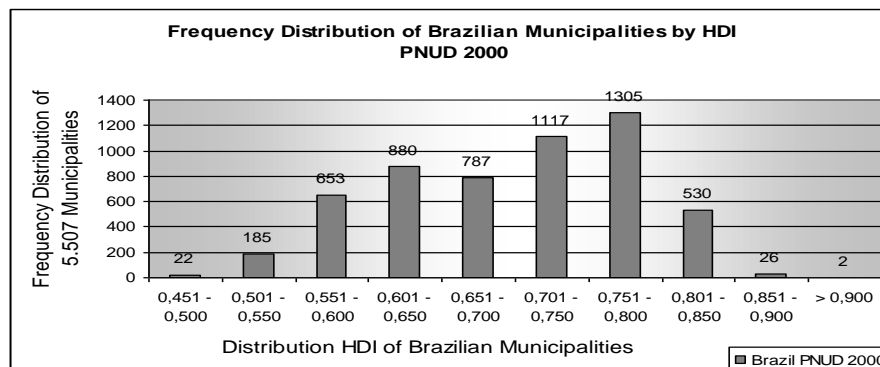

Chart 1: Frequency Distribution of Brazilian Municipalities by HDI
Source: PNUD 2000 (2012) [15]

2.3.2. HDI and GDP per capita of Brazilian Municipalities

The Gross Domestic Product of Municipalities, according to the Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics) IBGE (2012)[16], is calculated on a uniform methodology for all units of the Federation, and is conceptually integrated to the procedures adopted by the systems in the National and Regional Accounts, so that their results are consistent and comparable with each other and with national and regional results.

The Gross Domestic Product GDP is calculated considering the total of goods and services produced by resident producer units intended for final consumption being thus the sum of the added values- by the various economic activities plus taxes, less subsidies on products. The GDP, according to IBGE (2012)[16], is also equivalent to the sum of the final consumption of goods and services valued at market price and it is also equivalent to the sum of primary incomes. It can therefore be expressed by three points of view: production, expenditure and income.

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[14] ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Portifólio de Parques Tecnológicos no Brasil*. São Paulo: ANPROTEC, 2008.

[15] PNUD 2000, Programa das Nações Unidas para o Desenvolvimento, *IDH – Índice de Desenvolvimento Humano dos Municípios Brasileiros, 2000*. Disponível em: http://www.pnud.org.br/atlas/ranking/IDH-M%2091%2000%20Ranking%20decrescente%20(pelos%20dados%20de%202000).htm. Acesso em: 20/01/2012.

[16] IBGE, Instituto Brasileiro de Geografia e Estatística. *Produto Interno Bruto dos Municípios: 2004 – 2008 e 2005 -2009*. Disponível em: http://www.ibge.gov.br/home/download/estatistica.shtm. Acesso em: 12/01/2012.

Charts 2 and 3, show the evolution of the GDP per capita of Brazilian municipalities, according to documents published by IBGE (2012)[16], regarding the GDP per capita of 2006 and 2009.

It must be highlighted that the amount of municipalities considered by IBGE for 2006 when calculating the GDP per capita of the municipalities was 5.564 and for 2009, updated edition, was of 5.565 municipalities, according to IBGE (2012)[16].

Frequency Distribution of Brazilian Municipalities by GDP per capita IBEG 2006
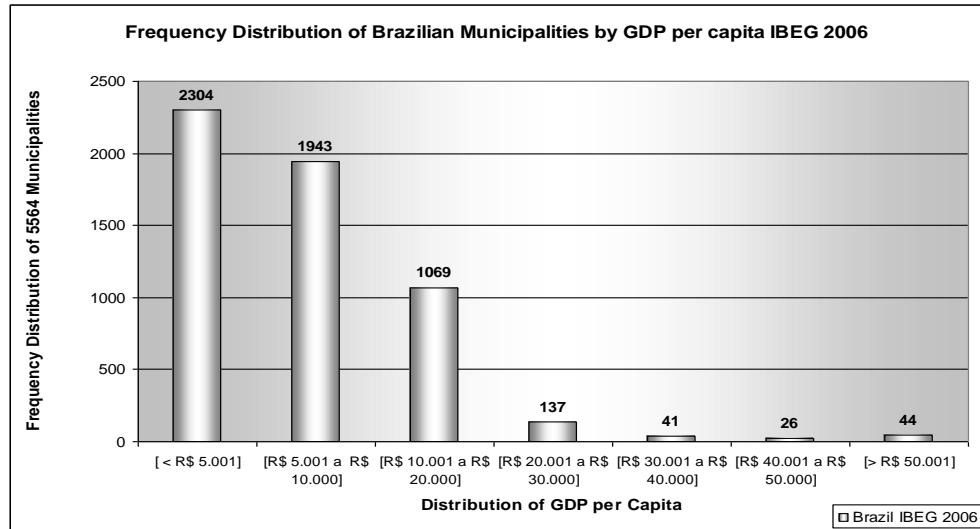
Graph 2: Distribution of Frequency of Brazilian Municipalities by GDP per capita - IBGE 2006 (2012)[16]
Source: Authors

Frequency Distribution of Brazilian Municipalities by GDP per capita IBEG 2009
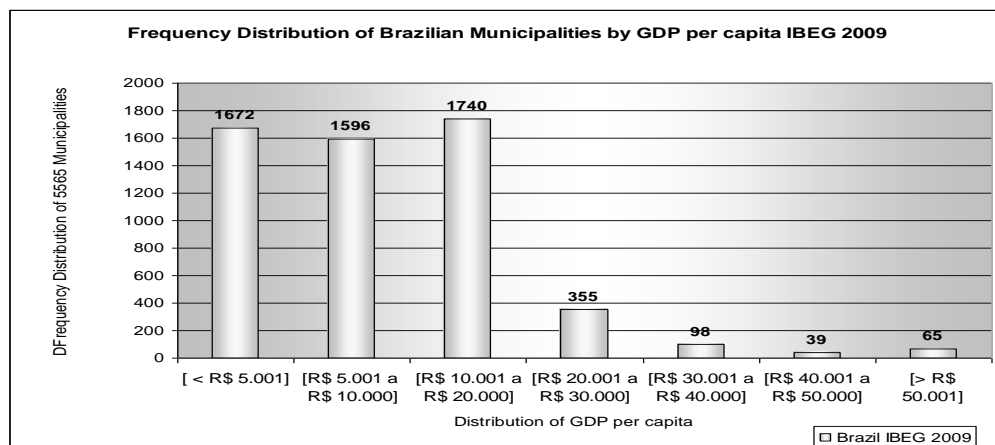

Chart 3: Distribution of Frequency of Brazilian Municipalities by GDP per capita - IBGE 2009 (2012)[16]
Source: Authors

In examining the two charts, we observe an improvement in GDP per capita of the cities, especially those which were below R$ 10,001.00 in 2006, representing 76.3% of municipalities, and which decreased to 58.7% with a significant increase in the municipalities ranging from R$ 10,001.00 to R$ 20,000.00, from 19.2% in 2006 to 31.3% in 2009, which meant an improvement in the purchasing power of their respective populations.

2.4. Frequency Distribution of Brazilian Technology Parks and Brazilian Municipalities by HDI and GDP per capita

By analyzing the distribution of Technology Parks in Brazil there is a concentration in developed and developing municipalities, but we do not notice the goal of creating technology parks in poor regions to eliminate inequality in Brazil. The following charts show the distribution of Technology Parks taking into consideration the HDI and GDP per capita of the cities.
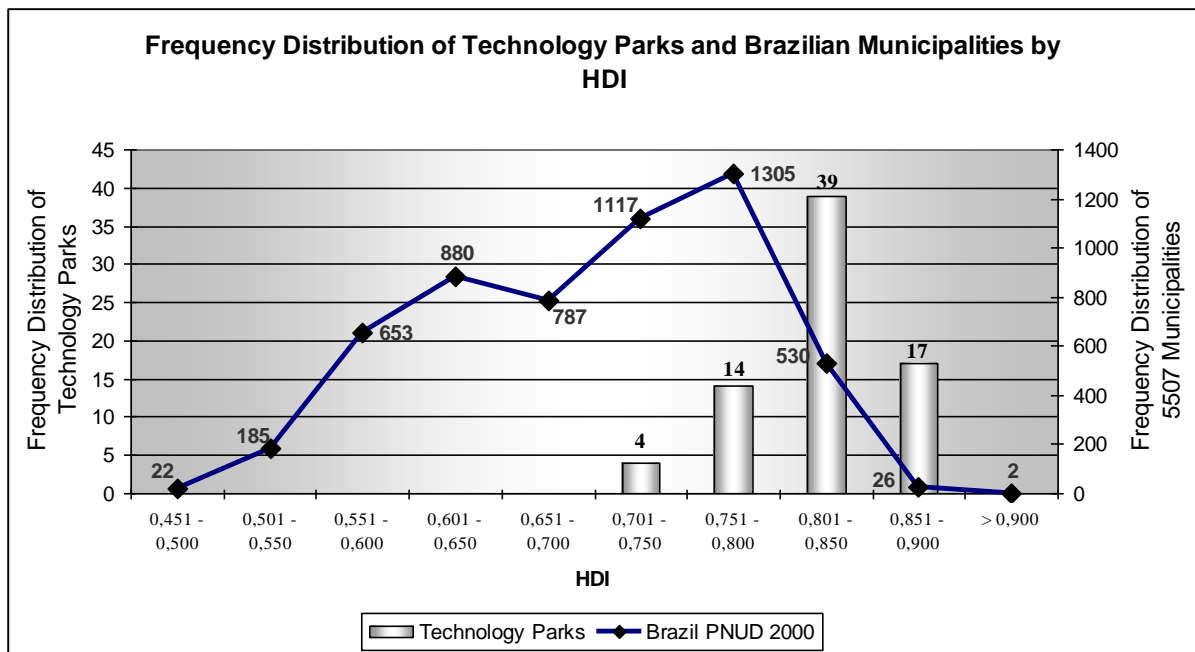
Chart 4: Frequency Distribution of Technology Parks and Brazilian Municipalities by HDI - PNUD 2000 (2012)[17] and ANPROTEC (2008)[18] data
Source: Authors

In Chart 4 it can be seen in the distribution of Technology Parks by HDI, the inexistence of Tech Parks in municipalities that have HDI below 0.701, with 2,527 municipalities in this range. In municipalities that show HDI above 0.900, São Caetano do Sul and Águas de São Pedro in the São Paulo State, also lack Technology Parks. However, these municipalities are located near large developed centers, universities and business complexes.

There are 17 Technology Parks established in municipalities whose HDI is between 0.851 and 0.900, while the number of municipalities in the same range of HDI is 26. This means that 23% of Brazilian Technology Parks are in municipalities with an HDI of 0.851 and 0.900, which means that these cities are developed and have resources.

Likewise, the 39 Technology Parks established in municipalities with HDI ranging between 0.801 and 0.850, represent 52.7% of Brazilian parks. Therefore, 75.7% of the parks are in the municipalities whose HDI is above 0.800. The other parks are located in cities, whose HDI ranges between 0.701 and 0.800.

By analyzing the information of ANPROTEC (2008)[18] and PNUD 2000 (2012)[17] it is perceived that 27 of 74 Brazilians Parks - 36.5%, are established in 11 cities, showing that these municipalities have at least 2 and a maximum of 5 Technology Parks. With the exception of Recife, capital city of Pernambuco State, whose HDI is 0.787; the other municipalities have their HDI between 0.815 and 0.875.

The current trend in establishing Brazilian Technology Parks in cities whose HDI is greater than 0.701 and which have universities, industries and support to their development, following the model of Technology Parks that worked worldwide, will seemingly continue to occur, forgetting the poor municipalities, making them even poorer unless there is development regarding both education and the development of jobs and income that the Technology Parks can provide.

This analysis shows that the distribution of technology parks in Brazil does not contribute to the eradication of poverty, benefiting only the municipalities and regions that already have industrial parks and universities.

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[17] PNUD 2000, Programa das Nações Unidas para o Desenvolvimento, *IDH – Índice de Desenvolvimento Humano dos Municípios Brasileiros, 2000.* Disponível em: http://www.pnud.org.br/atlas/ranking/IDH-M%2091%2000%20Ranking%20decrescente%20(pelos%20dados%20de%202000).htm. Acesso em: 20/01/2012.

[18] ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Portifólio de Parques Tecnológicos no Brasil.* São Paulo: ANPROTEC, 2008.
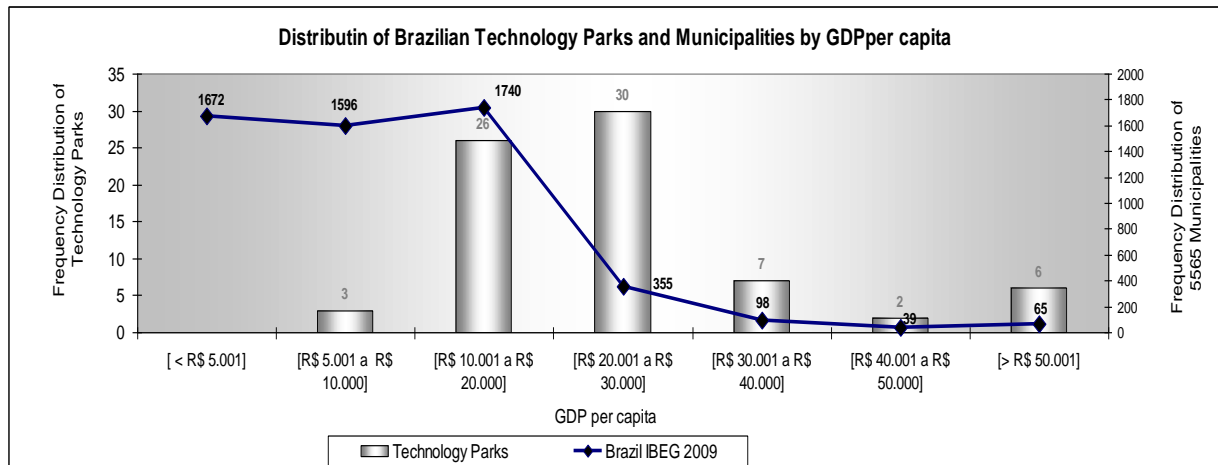
Chart 5: Frequency Distribution of Brazilian Tech Parks and Municipalities by GDP per capita - data IBGE 2009 (2012)[19] and ANPROTEC (2008)[20]
Source: Authors

Regarding the GDP per capita, it is very similar to the analysis and conclusions reached with the HDI - there are no Technology Parks in cities whose GDP per capita is less than R$ 5.000,00, level where the city of Ribeirão Branco - subject of this case study, was, on the occasion of the data from IBGE 2006 (2012)[19]. In the range where the GDP per capita is less than R$ 20,001.00, there are 29 Technology Parks, and 5,008 municipalities in this interval, which represents 90.0% of all municipalities. This means that few municipalities are served by reason of their geographical position, economic status, without industrial conglomerates without universities or research institutions, hindering the contributions of Technology Parks in the development of these municipalities. Therefore, there are very few municipalities served by these Parks.

From this analysis, it can be concluded that the public policies that encourages the creation of Technology Parks is inconsistent with the Brazilian reality.

This is a noticeable fact, and a cultural trait in science, technology and innovation in Brazil, when analyzing the National System of Brazilian Science, Technology and Innovation, in which society is excluded, showed by Table of Selected Actors in this System, see CGEE (2011)[21] and CGEE (2011)[22], where there are no representatives of Congress, meaning that there will not be so-called Technology Assessment Activities, according to RADER (2001)[23], as there are no representatives of Professional Associations, in this case workers and entrepreneurs, and other classes, as there are in the United States, where it started, and in Germany.

2.5. Prospective process contributing to the Regional Sustainable Development

The prospective process, according to Berger (1958)[24], provides seeing far, with amplitude, with depth, with dare, taking risks and thinking in human beings, and GODET (2001)[25] complements with seeing differently, hunting ideas, seeing together, with appropriation, using techniques and rigorous and participatory methods.

Figure 3 consolidates the regional prospective process, which follows his account briefly, macros in seven steps:

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[19] IBGE, Instituto Brasileiro de Geografia e Estatística. *Produto Interno Bruto dos Municípios: 2004 - 2008 e 2005 -2009.* Disponível em: http://www.ibge.gov.br/home/download/estatistica.shtm. Acesso em: 12/01/2012.

[20] ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Portifólio de Parques Tecnológicos no Brasil.* São Paulo: ANPROTEC, 2008.

[21] CGEE, Cento de Gestão e Estudos Estratégicos. *Quadro de atores selecionados no Sistema Nacional de Ciência, Tecnologia e Inovação, 2011.* Disponível em: http://www.cgee.org.br/quadro/MapaCTI_02jun10.pdf. Acesso em: 02/06/2011.

[22] CGEE, Cento de Gestão e Estudos Estratégicos. *Série Documentos Técnicos: Quadro de atores selecionados no Sistema Nacional de Ciência, Tecnologia e Inovação,* 2011a. Disponível em: http://www.cgee.org.br/publicacoes/documentos_tecnicos.php. Acesso em: 02/06/2011.

[23] RADER, Michael. *A Structured Longer Term Activity for ESTO: The Monitoring of EU Countries' Technological Future-Oriented Activities; Final Report on Project B: Monitoring of Technology Assessment Activities.* Karlsruhe: European Science and Technology Observatory Network – ESTO, March 2001.

[24] BERGER G., , «L'attitude prospective», L'Encyclopédie française, tome XX, Société nouvelle de L'Encyclopédie française 1958.

[25] GODET, M. Manuel de prospective stratégique, tome 2: l'art et la méthode », Dunod, Paris, 2001.
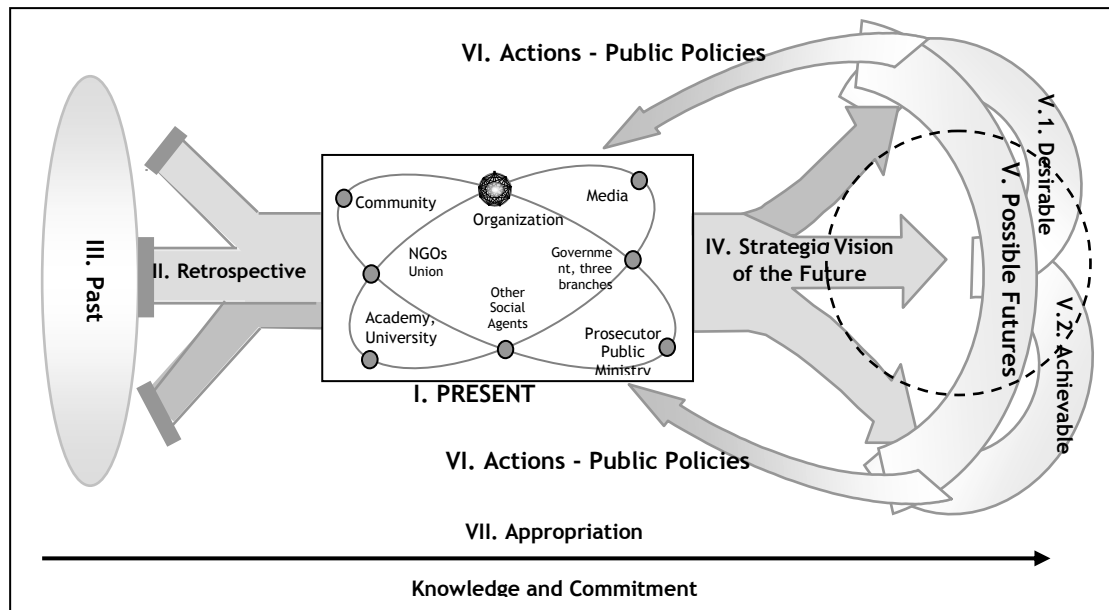
Figure 3: Framework of the Regional Prospective Process
Source: BASSALER (2008)[26], GODET (2001)[25], JOUVENEL (2008)[27], MARTIN (2001)[28], modified and consolidated by AULICINO (2008)[29]

The regional prospective process and description of Figure 3 are based on the authors: BASSALER (2008)[26], GODET (2001)[25], JOUVENEL (2008)[27], in brief:

I. **Present**: it consists of a governance, which can have up to three committees: *Steering Committee:* composed of the main usurers and the representatives of important social actors in the region; *Prospective Technical Committee:* composed of experts in prospective, and representatives of stakeholders chosen by the Steering Committee and by society, one or more of the participants of the Steering Committee should participate in this committee; and *Local Prospective Technical Committee:* if the region - focus of the prospective process, is far from the place where the experts in prospective are. This committee should be formed in the region, their members must be from that region and should be trained in prospective. Governance will be responsible for making the diagnosis, involving various social actors, involving the theme and the nine dimensions: economic, social, environmental, cultural, demographic, security and defense, political, legal and technological. To make the diagnosis it is necessary to perform the retrospective. For this to occur, it is crucial the participation of representatives of various stakeholders, where the process of sensitization and awareness by the Technical Committees will take place. After the sensitization and awareness, there is the preparation of a seminar that will hold several workshops. In the same seminar the main key variables will be identified and analyzed in depth in the Structural Analysis, containing the Cross Impact Analysis, which will identify the key driving variables that will contribute to the construction of the strategic vision of the future and consequently the construction of scenarios.

II. **Retrospective:** it is carried out by means of a questionnaire and deepening of the key variables that will verify the changes in the last twenty years, the ruptures and trends. This information will form a database. The prospective process should contain or develop the geographic information system to produce the map of the region and support the formulation of public policies.

III. **Past:** will be known through the retrospective and the reasons that caused the present situation, as far as changes, ruptures, trends, inertias and brakes that have hampered the possible changes are concerned.

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[26] BASSALER, Nathalie, "*La prospective dans le développement régional pour construire un avenir commun*", Présentation au petit déjeuner offert par la ADIAL BRASIL. São Paulo : nov 2009.

[27] JOUVENEL Hugues de. *La prospective territoriale pour quoi faire ? Comment faire?* Futuribles International, Séminaire de formation. Paris : 14-15 octobre 2008.

[28] MARTIN, Ben R. *Technology Foresight in a Rapidly Globalizing Economy*. Vienna. Proceeding of the Regional Conference, April 2001.

[29] AULICINO, Antonio L. *Estudo do Futuro:O que você deve pesquisar hoje?* Ciclo de Palestras sobre Inovação e Empreendedorismo, Agência USP de Inovação- Universidade São Paulo. São Paulo, ago-2008.

IV. Strategic Vision of the Future: After making a diagnosis in conjunction with the various stakeholders and the identification of key driving variables, a conjoint strategic vision of the future is built, envisaging the next 20 - 30 years, according to the desire of the participants, with the possible scenarios, contrasting and confrontational.

The construction of the overall strategic vision of the future is necessary to **anticipate** the actions and public policies in the present, so that this vision is achieved by mobilizing the intelligence of all participants. Thus, the inner motivation and identification of threats and opportunities contained in the strategic vision of the future are goals to be achieved at the same time, i.e., can not be achieved separately.

V. Possible Futures: the workshops provided the definition of the choice of several key variables, and scenarios were built by means of morphological analysis, identifying which of the key variables are the driving forces for the development of scenarios with more criteria, based on in-depth scientific insights, finding the desirable scenarios (V.1) and the achievable ones (V.2).

VI. Actions and Public Policies: After the planning process, comes the legal part which is the drafting of the contract to implement the plan, strictly speaking, the actions and/or public policies needed for its execution. In European countries it is a contract signed by regional representatives, elected in a democratic manner, and by government representatives. Together with this agreement there is the financial physical schedule.

VII. Appropriation: should determine the success of the prospective process, therefore the arrow in Figure 3 is continuous through all the steps. Due to the transparency of the process, the mobilization cannot concentrate excessively on the strategic choices, especially when they have a confidential and often individual character. Given these conditions, the collective prospective planning should be forward thinking about the threats and opportunities, mainly the external ones, that motivate the mobilization and enable the appropriation of the strategy.

2.6. Strategic Planning and Strategic Map

The preparation of the Strategic Plan is crucial for the creation of a Technology Park. Thus, the Technology Park must align people's behavior, organizational structure and strategy formulated to achieve the objective set, as in MILLS (1993, p. 117-118)[30] and illustrated in Figure 4.
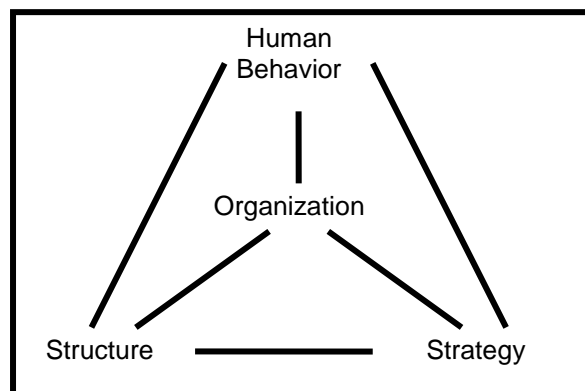

Figure 4: Alignment of strategy, structure and human behavior.
Source: MILLS (1993, p. 118)[30]

One of the alignment factors shown in Figure 4, according to MILLS (1993), is human behavior, if there is no commitment of people who work and/or participate in the organization, in the case of the Technology Park, from the general manager to all the people who work there, it will be difficult to lead the organization in the desired direction. To this end, there is the need to motivate the people involved.

According to ANSOFF and McDONNEL (1993:70)[31], they represent the ends that the organization is trying to achieve, while the strategy is the means to these ends. To formulate the strategy it is necessary to diagnose the current situation of the Technological Park. The analysis of the current strategic situation identifies the internal aspects, classifying them into strengths and weaknesses; it

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[30] MILLS, Daniel Quinn. *O Renascimento da Empresa*. Rio de Janeiro: Editora Campus, 1993.

[31] ANSOFF, H. I.; MCDONNELL, Edward J. *Implantando a Administração Estratégica*. 1a edição, 3a tiragem. São Paulo: Editora Atlas, 1993.

also identifies the external aspects, categorizing them into opportunities and threats, according to OLIVEIRA (2004)[32].

When making the strategic diagnosis, the organization knows its current situation, and decides whether it wants to keep the strategic posture or if it wants to assume new position, which will involve the formulation of new strategies. The strategy to be formulated should always be a smart, sustainable (economic, social and environmental) feasible and, whenever possible, original and even astute, especially in the case of Technology Parks.

The strategy, according to KAPLAN and NORTON (2004)[33], is one of the phases of the continuous logical process that moves a whole organization, that starts in the declaration of its *mission*: why the organization exists; the definition of its *values*: what is important; of its *vision*: what the organization wants to be in the future; the *formulation of a strategy*: how it will achieve the objectives; the elaboration of the strategic map up to the definition of personal objectives.

The strategic actions mean putting the formulated strategies into practice, which, to be implemented, require that the organization have people who understand it, including its critical processes, though complex, through which intangible assets are converted into tangible results, creating value. The strategic map helps represent this difficult task, according to KAPLAN and NORTON (2004)[33].

The Tech Parks generate intangible assets such as knowledge and technology, providing indirect value creation both for organizations and for the region where they are established. The preparation of the strategic map using the four perspectives of the Balanced Scorecard - BSC provides a model that shows how strategy links intangible assets to processes that create value, according to KAPLAN and NORTON (2004)[33].

The four perspectives defined by the BSC, according to KAPLAN and NORTON (2004)[33], begin by the *perspective of learning and growth* which is responsible for the organization's performance; in this case the people, who shall be trained to contribute as best as possible so that objectives are met by the organization. In Tech Parks, this perspective entails the information systems and organizational structure needed to support decisions and bolster the internal processes of value creation. The other *perspective is of the internal processes*, which identifies the processes required and those causing impacts on the development of the organization, in this case, the Technological Park. Following that, the *perspective, which in this paper is called supporters, sponsors and clients*, which defines the value proposition to those who somehow will benefit from the knowledge, the technology and the results of the Technological Park. Finally, *the perspective, entitled developmental and financial*, which are the tangible results achieved by the organization - in this case, by the Technology Park. The four perspectives are connected with each other by relations of cause and effect.

3. METHODOLOGY

This paper considers the exploratory research and documentation, along with the review of literature and a documental review. According to GIL (1999, p 43)[34], the exploratory research aims to develop, clarify and modify concepts and ideas in order to formulate more precise problems or researchable hypotheses for further studies. It is the first step in a broader and more comprehensive research.

In addition to the exploratory research, it was opted for an action research for this paper. According to THIOLLENT (2002, p 14.)[35], action research is a kind of empirically based social research that is designed and carried out in close association with an action or to solve a collective problem and in which researchers and participants representative of the situation or problem are involved either cooperatively or in a participatory way.

The action research methodology was chosen here because of the direct participation of representatives of society, citizens of Ribeirão Branco, a municipality in the State of São Paulo, Brazil, in the drafting of the Strategic Regional Prospective of the Municipality.

The municipality of Ribeirão Branco has the following characteristics: it is located in the Southwest region of São Paulo, situated 210 km from Curitiba and 310 km from São Paulo. Estimated population: 22,674 inhabitants, area: 697,813 km^2; Human Development Index (HDI): 0.649. It is the

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[32] OLIVEIRA, Djalma P. R. *Planejamento Estratégico*. 20a edição. São Paulo: Editora Atlas, 2004.

[33] KAPLAN, Robert S. and NORTON, David P. *Strategy Maps*. Cambridge, USA: Harvard Business School Publishing Corporation, 2004.

[34] GIL, Antonio Carlos. *Métodos e Técnicas de PESQUISA SOCIAL*. 5ª. ed. São Paulo: Editora Atlas, 1999.

[35] THIOLLENT, M. *Metodologia da Pesquisa-ação*. 12ª. ed. São Paulo: Cortez Editora, 2003.

penultimate municipality of São Paulo, and one of the poorest, the HDI Income: 0.573, the HDI Longevity: 0.600 and HDI Education: 0.775, according to PNUD (2000)[36]. The GDP per capita was R$ 4,681, according to IBGE 2006 (2012)[37], with the recent update of IBGE 2009 (2012)[37] on the GDP per capita of the municipalities, Ribeirão Branco, has a GDP per capita of R$ 10,914.76. The municipality of Ribeirão Branco borders the following municipalities: Apiaí, Itapeva, Nova Campina e Guapiara.

The municipality of Ribeirão Branco and its neighbors have as vocation: agriculture, mining and silviculture. It is close to the largest continuous patch of Atlantic Forest.

Ribeirão Branco needs a new momentum of development, i.e., a new position, a new identity and a reconstruction with a shared long term vision, aiming to avoid: their slow evolution, the devitalization of its rural area and shrinkage of its population. Its population has decreased from 22,674 to 18,269 inhabitants, according to IBGE (2012)[37]. This decline is due to young people between 20 and 40 leaving the city in search of better opportunities.

In this context, the regional prospective process contributes to planning and building the development of this municipality. The prospective process began in Ribeirão Branco with a meeting in September 2010, which construed the governance process, and defined three committees: Steering (13 people), Technical Prospective (10 people) - in which the prospective experts took part, and Regional Technical Prospective (30 people).

The Steering Committee defined: the horizon of 20 years, and the slogan: "Our Common Future - 2030 Ribeirão Branco" and the objective: **"BUILDING A STRATEGIC VISION OF THE FUTURE FOR RIBEIRÃO BRANCO 2030"**, by means of a prospective process, and from it, devising the **Municipal Master Plan of Ribeirão Branco.**

4. DATA ANALYSIS AND RESULTS

From the definitions of the Steering Committee and with the defined objective: "Building Strategic Vision of the Future of Ribeirão Branco 2030," the prospective process began.

For the Regional Technical Prospective Committee was given a training course on Regional Prospection action, attended by 24 people. Meetings were held with various communities approximately thirty (30), with young people and entrepreneurs of Ribeirão Branco, to raise awareness and consolidate the concepts of the prospective process. After this phase of awareness was held the 1st Regional Prospective Seminar, two-day, was attended by representatives of the various types of stakeholders, who were distributed in six different workshops. The seminar included two days of workshops, in which about 102 people participated all together, even though only 77 participated in the both days of workshops.

The result of these workshops of the seminar presented the diagnosis of the society in Ribeirão Branco and its priorities. We chose 44 (forty four) variables, which were further developed. This phase is called Structural Analysis

At the stage of structural analysis we performed a Cross Impact Analysis, with the participation of 21 (twenty one) people belonging to the Regional Technical Prospective Committee, where we identified the thirteen (13) key driving variables: 1- Incentive to Eco-agricultural practices (IPRAGECO); 2- Cultural Rescue (RESCULT); 3- City Hall of Ribeirão Branco (PREFRB); 4-Planning, Implementing and Running the Ribeirão Branco Technology Park (PIEPTRB); 5- Lack of political vision of society (FVPS); 6- Lack of investment in Tourism (TURISMO); 7- Ribeirão Branco Town Council (CAMRB); 8- Rural Mapping of Ribeirão Branco (MARB); 9- Family agriculture (AF); 10- Improvement in professional quality (MQPROF); 11- Guaranteeing access to National Policy ATER (ATER); 12- Develop the agro-industry (DESAGROIN); 13- Lack of people for project design (AUPELPROJ).

Figure 5 contains the results of the Matrix Indirect Influences (MII) produced by the software MICMAC LIPSOR, CNAM, GODET (2001)[38], which is the multiplication of order 4 (four times multiplied by it) of the Matrix of Direct Influence (MDI). The MII shows the key variables that are most influential, driving, and more dependent. The driving ones are in quadrants I and II are the thirteen (13) variables that are used to develop the municipality of Ribeirão Branco. It should be noted that

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[36] PNUD 2000, Programa das Nações Unidas para o Desenvolvimento, *IDH - Índice de Desenvolvimento Humano dos Municípios Brasileiros, 2000.* Disponível em: http://www.pnud.org.br/atlas/ranking/IDH-M%2091%2000%20Ranking%20decrescente%20(pelos%20dados%20de%202000).htm. Acesso em: 20/01/2012.

[37] IBGE, Instituto Brasileiro de Geografia e Estatística. *Produto Interno Bruto dos Municípios: 2004 - 2008 e 2005 -2009.* Disponível em: http://www.ibge.gov.br/home/download/estatistica.shtm. Acesso em: 12/01/2012.

[38] GODET, M. *Manuel de prospective stratégique, tome 2: l'art et la méthode »,* Dunod, Paris, 2001.

the quadrant II represents the variables of innovation, which are very influential and dependent. The variable PIEPTRB, Plan, Implement and Run **Technology Park of Ribeirão Branco** (PIEPTRB), is circled with a dotted line.
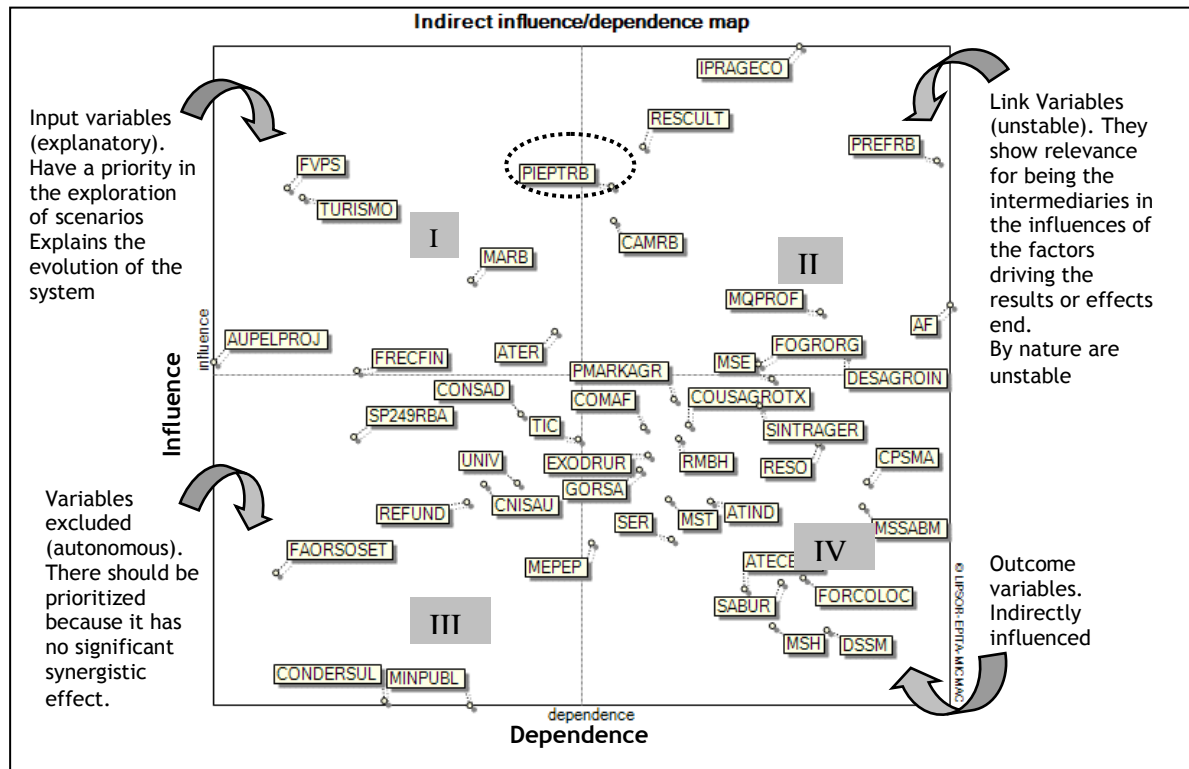

Figure 4: Indirect Influences and Dependences Map or Plan of Prospective Process of Ribeirão Branco
Source: Software MICMAC LIPSOR - GODET (2001) [38]

When the prospective process is built in conjunction with representatives of society and appropriation, we notice the identification of the needs of the Technology Park. Clearly, then, that in regions or municipalities with low HDI and low GDP per capita, as discussed previously, the establishment of Technology Parks is needed as a form of development of science-based knowledge and retention of young people from emigrating to developed centers. In the case of Ribeirão Branco, this variable was very strong and it is associated with Tourism. One of the influential variables analyzed is the Lack of Political Vision of Society. And possibly due to this lack of political vision of society that the Technology Parks are established in developed regions with HDI above 0.701 and GDP per capita over R$ 5,000.00.

From this result, planning the Technology Park of Ribeirão Branco began, with the participation of 15 people, representing the various types of stakeholders.

4.1. Planning the Technological Park of Ribeirão Branco

The Technology Park of Ribeirão Branco in Sao Paulo, has as its main objective to be a project to promote development of regions through business development, science and technology, encouraging the creation, deployment and development of knowledge-intensive companies, of the entrepreneurial culture, innovation, synergy between the participants of the Park and the systems of science and technology in order to confer cooperation, market and international recognition to the set.

The Technology Park of Ribeirão Branco's mission, values and vision are, as follows:

Mission - To promote regional sustainable development through the generation of knowledge, products and services through science and technology and innovation to serve society, contributing to its transformation.

Values - Ethics, Transparency, Quality, Participation, Fellowship, Commitment, Humility.

Vision – Center for generation of innovative and technological solutions aimed at building a sustainable and just future for all of society.

The defined objectives were nine:

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a) be a space to develop the knowledge, science and technology, providing a favorable environment for intellectual production, focusing on technological innovation and creative output of results amenable to immediate use, combined with an entrepreneurial culture and available for investment;

b) be an example in environmental matters with the creation of preservation, conservation and recreation areas integrated with green spaces, and the implementation of recovery programs of the Atlantic Forest and environmental education;

c) remain open to the region, having the infrastructure and public spaces for democratic practice and promotion of citizenship;

d) receive and attract technology-based companies in various areas of knowledge, laboratories, research centers and businesses, and dynamic structures, already existing and established businesses and institutions;

e) promote the synergy of these entities in the park and with the other actors in local development in the region in the State and in Brazil and internationally, particularly between teaching and research institutions, government agencies, development agencies, community associations companies and other relevant entities;

f) promote training in general, the various areas of scientific and technical knowledge that are needed for regional and national development;

g) promote sustainable development organized by municipalities, states, countries and regions taking into account the various dimensions, which are demographic, social, political, environmental, cultural, technological, economic, and legal also considering the interaction and integration between different social actors through the regional prospective process.

h) promote development through the prospective of subjects that are required for regional and national development.

i) promote the improvement of quality of life.

For the creation of the Strategic Planning, a SWOT analysis was used (**S**trengths, **W**eaknesses, **O**pportunities, **T**hreats) in order to identify the internal strategic aspects, strong and weak points, and the external aspects, opportunities and threats, as in OLIVEIRA (2004)[39]. The issues were prioritized and the actions defined for each aspect. After that, the macro strategy was formulated for the Future Technology Park.

In the Strategic Map of the Technological Park of Ribeirão Branco perspectives, according to according to KAPLAN and NORTON (2004)[40], were described from the learning and growth of people, thus:

a) **Perspective of learning and of personal growth** considers: the preparation and motivation of people who will work in the Park. People should be empowered to develop and manage projects, to conduct the Regional Prospective processes and Technological issues, provide tourism services for the region. In this perspective, also consider the concern with the motivation and commitment of generating the various partners of the Technology Park, also considering the members of the Steering Committee of the Park.

b) **Perspective of the internal process** considers: the people who acquired a competence from the learning perspective. The processes of this perspective, comprise the following areas: planning and projects development area, the marketing and communications areas, that will prepare and implement the Marketing Plan and Communication Plan, and catchment area of the Park sponsors and clients; the finance and administrative areas, areas of research and development, through the preparation of a planning, organization and evaluation, the area of training to develop technical courses needed for regional development and Postgraduate courses in Regional Prospective and Technology; the area of prospective development of the process for developing regional and technological issues, the hotel management and restaurant of the Park, the area of preparation and control of contracts and other partnerships with various entities, companies, institutes and so on.

c) **Perspective of sponsors and customers** considers: the management of contacts with the various people who are in senior management of organizations to strengthen the development of the Park, providing technical support and training to small and medium industries and agriculture, family, small and medium-sized; contribution to the development of companies through technological bases of scientific knowledge in the field of complex techniques, developing incubators, encouraging small businesses and start-ups; contributing scientifically: Regional

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[39] OLIVEIRA, Djalma P. R. *Planejamento Estratégico*. 20a edição. São Paulo: Editora Atlas, 2004.

[40] KAPLAN, Robert S. and NORTON, David P. *Strategy Maps*. Cambridge, USA: Harvard Business School Publishing Corporation, 2004.

development in the preparation of Master Plans, Regions, States and LC (Local Clusters), the necessity of other types of investors to contribute to the development of the Technology Park.

d) Development and financial perspective: from the services provided and results obtained in the previous perspectives, this approach seeks to obtain financial and material resources to develop the Technology Park and contribute to regional development.

Among the actions planned, the priority for the feasibility of implementation and establishment of the Technology Park in Ribeirão Branco are those related to legal compliance in terms of companies. At the same time an area of 26,388 m^2 is being considered to donation by the Municipality, big enough to start the Technology Park.

After several contacts made with various scientific research institutions, some potential research projects to be developed were identified by means of the regional prospective process: the technological development of dynamic mapping of the territory, sustainable construction, recycling of building materials and entrepreneurship; medicinal plants and herbal medicines; herbal products, the plant *pereskia*; and a regional development center.

In the case of agricultural projects, the Technology Park of Ribeirão Branco, may mediate knowledge of results of scientific technical projects for farming surveyed by the Brazilian Agricultural Research Corporation - EMBRAPA, retransmitting them didactically with an foundation of entrepreneurial basis to the family farm, also to small and medium-sized producers, improving quality and productivity of the agricultural products of the municipality.

The other vocation that can be addressed by the Technology Park is mining. The Park may be the intermediary to pass on the knowledge of results of technical projects of scientific management, exploration and mining processing, allowing businesses to exploit ore established in a sustainable manner, minimizing losses and having concern for the health and safety of workers.

In addition to contacts with government and private research organizations, there was contact with the University that may establish a campus at a distance of approximately 90 km from Ribeirão Branco.

At the same time meetings were conducted with the federal government for guidance on resources to start developing the park, from the construction project to its establishment. In Brazil, the allocation of resources for Technology Parks is for rich regions and in places where there are already industrial complexes and universities, according to the analysis of commented graphs 4 and 5. The Technology Park of Ribeirão Branco should break this paradigm, representing a breach of procedures in relation to seventy-four Technology Parks, as in ABID and ANPROTEC (2008)[41], in operation, implementation and project.

It is important to highlight that the difficulty of access to the city of Ribeirão Branco and its geographic isolation, does not allow the connection with research entities and tourism development as a consequence it does not have lodging and restaurants to receive visitors or tourists and/or researchers, although it has several natural tourist attractions, mainly for being too close to the largest continuous patch of Atlantic Forest. For this reason, in the prospective process and the Technology Park, another opportunity was identified, which is to constitute a cell to develop tourism. This opportunity was the sixth key variable identified by prospective process to develop Ribeirão Branco. To that end, a training center in tourism services, hospitality and restaurant will be developed, which will contribute to the training of people who will work in this sector, especially low-income youth.

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[41] ABID, Agência Brasileira de Desenvolvimento Industrial e ANPROTEC, Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores. *Parques Tecnológicos no Brasil: Estudo, Análise Proposições, 2008*. Disponível em: http://www.abdi.com.br/Estudo/Parques%20Tecnol%C3%B3gicos%20-%20Estudo%20an%C3%A1lises%20e%20Proposi%C3%A7%C3%B5es.pdf. Acesso em: 20/10/2010.

5. FINAL CONSIDERATIONS

It can be concluded that the participation of society in the prospective process for the development of the Municipality of Ribeirão Branco was important since the community is motivated and committed to the establishment of the Technology Park. Among the lessons learned in this work we highlight:

1) The establishment of a Technology Park should be developed not only in structured and evolved regions, where industrial complexes, universities and research institutions are located. The Technology Park should contribute to the development of poor regions, accelerating this process, as occurred in the United States with the development of the first Technology Park, according to UNESCO (2011)[42].

2) In a participatory process, as is the case of the prospective, there are difficulties in relationships between various stakeholders. These difficulties are related to different reasons, whether cultural, ideological, political, or various other reasons. It is perceived in the process, for example, that representatives of the academia have difficulty in relationships with business representatives who, in turn, have difficult relationships with representatives of the working class, and vice versa. However, for the development of a municipality and/or of a Technology Park to occur, representative bodies of the industry, and all stakeholders to be involved in this process, should have their awareness raised, and should be motivated. And the prospective process includes these phases, since it requires the anticipation for the action with appropriation by all stakeholders involved. Because when the objective is greater than the individual or group interest, everyone starts working together, synergies are built and the proposals are set out in favor of the sustainable development of the Technology Park and the Municipality.

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[42] UNESCO. *Science Policy and Capacity-Building: Concept and Definition*. Disponível em: http://www.unesco.org/new/en/natural-sciences/science-technology/university-industry-partnerships/science-technology-park-governance/concept-and-definition/, acessado em 24/11/2011.