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A Governance Model for Science and Technology Parks

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What are the STPs evolving into?

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A Governance Model for Science and Technology Parks

Executive Summary

The Science and Technology Parks (STP), with its recognized ability to stimulate the development and wealth creation in the Knowledge Society, is a phenomenon widely studied in the past six decades. The research[1] that led to this article unifies two fundamental issues. Designed the concept of Corporate Governance (CG) on the organizational structure of a Technology Park in Brazil, within the domain of science, technology and innovation (ST&I),characterizing it as a STP. Likewise, sought to define CG in this context in order to support the proposition of a Governance Model for STP in Brazil. This model was submitted to the verification check on a sample consisting of a reference company and three recognized Brazilian STPs. The results provide an innovative framework that allows the effective incorporation of best practice governance processes of STPs.

Index

[1] GIUGLIANI, Eduardo. Governance Model to STPs in Brazil. 2011. 310 p. Tese (Doutorado em Engenharia e Gestão do Conhecimento) – Programa de Pós-Graduação em Engenharia e Gestão do Conhecimento da Universidade Federal de Santa Catarina, Florianópolis, 2011. Available in: http://verum.pucrs.br/F/?func=find-b&find_code=SYS&request=000433973

1. Introdution

The process of complete disruption faced by a new society, measured by the intangibility of knowledge, globality, and the potential of the social and intellectual capital of organizations, has led the world onto distinct paths and into the evolution of organizations and their management models. The experiences so far, based on different foundations and paradigms, clearly do not represent support for current demands anymore. It is within this context that contemporary organizations are inserted, much like Science and Technology Parks (STPs), potentially identified both as vectors and as mechanisms of induction of sustainable development. The scope of this research was to focus on proposing a governance model based on internationally recognized concepts of Corporate Governance (CG), adjusted to the new organizational environment of the STPs, verifying their inclusion for greater sustainability to established constructs.

The evolution of this particular type of organization, their generations, their strengths and their weaknesses could be followed over the past fifty years. Approaches may vary, focusing on historical context, organizational characteristics or their synergies. However, although varied, these objects of analysis show convergence of opinions toward today's emerging demands, a context imposed as organic and systemic, rooted in scientific and technological advance and innovation. Moreover, new management practices, supported by the fundamentals of Administration and Economy, including the new discipline of Knowledge Management, so as to add competitive advantages from the organizational capacity to create, disseminate and utilize knowledge, the invaluable intangible asset. It is the sustainable development of these new arrangements and organizational structures, identified here as Science and Technology Parks, what justifies the adoption of new actions and mechanisms of support, monitoring and control, based on the principles of Corporate Governance.

These initiatives become relevant due to the pressing need to restore the importance of STPs as leading players in the development of a region or country, whether in the emulation of public policies, the synergy between the agents involved in the attraction of investment resources, or the greater competitiveness of their products and services. This research focuses on CG in the context of the organizational environment of a STP. CG currently incorporates acknowledged concepts, mechanisms and practices, establishing the basis for contemporary organizations to embrace new requirements such as control, monitoring, credibility, disclosure and attractiveness, in addition to the establishment of a set of best practices upon their implementation.

In order to strengthen the analysis of a STP, it is viewed from a range of initiatives with a focus on knowledge and innovation, which means their occurrence and critical success factors should not be the result of isolated actions, but of an integrated policy instead. This research addressed proximate organizational structures, such as Innovation Systems; Innovation Hubs; Clusters; Industrial Districts and Innovative Milieu, so as to better adjust the boundaries and limitations for the proposed focus of a Governance Model for Science and Technology Parks.

Worldwide literature does not present STPs as a single concept, despite the convergence with the concept supported by the IASP (International Association of Science Parks). In order to outline the current profile of these organizations and the ways in which they function, several scenarios are studied, one of them focusing on broader characteristics from the organizational structure. In another, we discuss key factors of success for the STPs, based on studies of the United Kingdom Science Park Association and the European Commission. Stakeholders are also identified, from conceptualization and distinct objectives [2]. In this context, the research consolidates the presentation of a typical STP framework and its various bodies involved.

Figure 1 attempts to illustrate the contextualization of the problem addressed, in order to give greater depth and breadth to the study. Thus, looking to better position the STP entered into a set of dimensions of analysis that involves the Knowledge Society; Knowledge and Innovation - as new

[2] ARROYO-VAZQUEZ, Mónica; SIJDE, Peter Van Der. **Entrepreneurship encouragement and business development support at universities and science parks:** Proposal for a new conceptualization. Industry & Higher Education, v. 22, n. 1, p.37-48. 2008.

concepts to be incorporated; National Innovation System (NIS) - as collective and synergistic actions to public policies implementation; Local Productive System (LPS) - articulated as economic agents for the introduction of new products and processes, and Industrial/Clusters Districts - as productive clusters for specific purposes. It is between these boundaries that a new position is set for the STPs, having in its surrounding the Governance and its model[3].

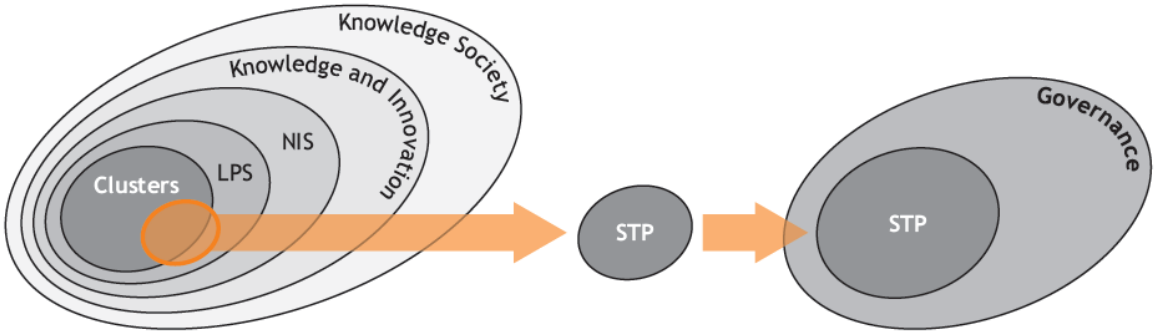

Figure 1: contextualization of the problem - STP and Governance

The proposal of a Governance Model for STPs is based on acknowledged fundamentals and concepts of acknowledged CG already applied to other organizational segments, especially in companies related to the stock market (Corporate Governance - Stock Market) and Information Technology (IT Governance) . Under these concepts, the CG is to provide a set of internal and external mechanisms to align the interests of the Principals (Shareholders) and the Agents (Managers). For this purpose we analyzed the Agency Theory, in which a relationship is established between the parties on a contractual basis to meet the interests of the Principal, involving the delegation of power for decision making by the Agent. The success of this complex enterprise is view from the standpoint of the satisfaction of the interests of the Principal, in contrast to the inadequate maximization of the interests of Agents, seeking to minimize the conflicts between the parties. Monitoring and control mechanisms are established in order to handle the Agency Problems and reduce those differences. Established by the Organization for Economic Co-Operation and Development, the principles of governance involve disclosure, fairness, accountability and corporate compliance. The governance model proposed is rooted in the concepts of these two foci of analysis, the STPs on the one hand and CG on the other, adjusted to a specific taxonomy from which the organizational structure of a STP is to be presented in three levels: 1) Principals; 2) Corporate Governance Structures; and 3) Science and Technology Park. Each of the levels consists of dimensions, and the 2nd level is specifically set to represent the Model Field Analysis of Governance for STPs from ten fields based on the dimensions of: Decision Making, Governance Mechanisms, and Agency Costs and Problems. This model was consistency-checked from a sample of four organizations, one of them being a business enterprise identified in the Brazilian market for its adoption of a set of good high-level governance practices, and the others are related to Brazilian STPs: TECNOPUC, TECNOSINOS and SAPIENS Park.

[3] ABDI (Brazilian Association of Industrial Development). **STPs in Brazil: Study, Analysis and Propositions:** Executive Summary. Brasília: ABDI/ANPROTEC, 2008. 24 p.

2. Knowledge Society

We currently live in what is known as the Knowledge Age. Now, the 'knowledge' cannot be treated as 'a' factor of production of this new era, as they were previously considered the land, the work and the capital, but 'the' only resource, "which makes this unique new society"[4]. The fixed assets, tangible said, are of less value than the intellectual capacity and service of people and organizations, characterized as intangible assets. In this sense, knowledge places individuals, organizations and governments as factors of inestimable importance in the sense of leadership development strategies, focusing on a global and forward-thinking, with a view to adding value to new products and services and sustainability its growth and welfare of its population[5,6].

The intensive use of knowledge in the world economy and the increase of human ability to distribute it and share it added value to all participants in the contemporary economic system. The resulting implications of these changes are profound, not only in corporate strategies and government policies, but also for the institutions and systems used in the regulation of economic and human behaviors in this new society.

Many countries have convergence in their actions, pointing knowledge and innovation as vectors for development, even forging different practices and appropriate to the environment itself on its behalf[7]. A new society within this boundary requires political actions that are more organic and systemic nature, valuing national, regional and local dimensions and developing strategies for all areas. Economic development is a social process and, as knowledge economy, is not only growth and competitiveness, but also social inclusion and social welfare. Thus, the agenda of a knowledge-based economy should be geographically well distributed and used as a basis to unify and group areas apparently not related (ABDI,2007).

The nations that intend to thrive with a high competitive standard in this society will be those that compete with high technology and intellectual strength, attracting highly qualified individuals, firms with potential for innovation and ability to turn innovation into business opportunity[8].

Within this context, the evolution of today's world can also be viewed from four dimensions, with poorly defined boundaries between them, while sharing knowledge as a point of action and interest, as illustrated in Figure 2:

- Knowledge Society
- Knowledge Economy
- Knowledge Intensive Organizations
- Knowledge Workers

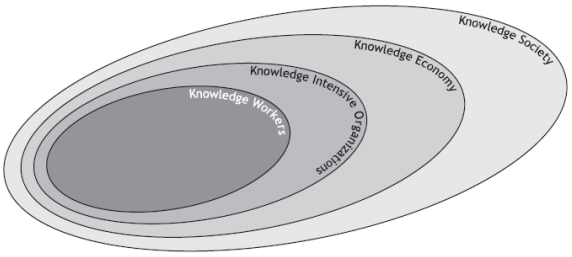

Figure 2: Knowledge Society's analysis dimensions

Widely accepted concept records that knowledge has replaced the industrial organization and production as the main factor of production. The current value in the products is not tied merely to the amount of material, or labor and capital involved in its production, but mainly to the added

[4] NONAKA, I. TAKEUCHI, H. **The knowlegde-creating company**. Rio de Janeiro. Editora Campus – 14ª edição, 1997. 358 p.

[5] ABDI (Brazilian Association of Industrial Development). **STPs in Brazil: Study, Analysis and Propositions: Module 1**. Estudo sobre alternativas bem sucedidas de Modelos de Parques Tecnológicos e de Programas Apoio no Exterior. Brasília: ABDI-ANPROTEC. 2007. 131 p.

[6] ABDI (Brazilian Association of Industrial Development). **STPs in Brazil: Study, Analysis and Propositions: Module 2.** Políticas mundiais para o desenvolvimento econômico baseadas em conhecimento e inovação Brasília: ABDI-ANPROTEC. 2007. 249 p.

[7] DTI (Department of Trade and Industry). **A Regional Perspective on the Knowledge Economy in Great Britain.** London. 2002. 54 p.

[8] DTI (Department of Trade and Industry). **Science & Innovation**: Investment Framework 2004 – 2014. London. 2004. 200 p.

knowledge in the final product. Thus seen, the knowledge is presented as the most important factor of production, overcoming capital and labor.

The Knowledge Economy is most commonly defined [9,10], considering the base of organizations in terms of technology and knowledge: R&D, high use of ICT and a large number of graduates and professionals in science, engineering and technology. It has two fundamental vectors, not excluding others: knowledge-intensive economic activities and globalization (with the motivating factors of the technological revolution, the dynamic pace of change and deregulation of markets).

The organizations that make up this market are often defined in terms of knowledge intensive organizations with their production based on Information and Communication Technology (ICT), their use and sharing, and a highly skilled workforce. In a new context, which knowledge becomes the main factor of production, workers that accompany this transition present a 'label' of 'Knowledge Workers', feature multidisciplinary.

Within the conceptual context, knowledge has suggested the adoption of several complementarities that amplify its importance. The diffusion of a new pattern is linked to new forms and practices of capital accumulation, knowledge and output formats, as well as marketing and consumption, cooperation and competition, and capital appreciation movement, in which new technologies and systems also induce the innovative concepts of territorial development. Focusing on the vector of globalization and the rapid acceleration of its financial dimension, there is a revaluation of the spatial dimension, stressing the importance of differentiation between places and their environments as competitive advantages, thus offering support for the relevance of STPs at present.

[9] BRINKLEY, Ian. **Defining the knowledge economy.** The Work Foundation. London. 2006. 31 p.

[10] BRINKLEY, Ian. LEE, Neil. **The knowledge economy in Europe.** The Work Foundation. London. 2007. 31 p.

3. Science and Technology Parks (STPs)

Science and Technology Parks are not objects of consensus definitions and much less unique [11, 12], varying in extent and in the proportion of their goals. On the other hand, except conceptual distinctions, characteristics and perspectives have converged within the current contemporary: they aim to contribute to the strengthening of local infrastructure and the enhancement of institutional and social capitals, providing greater visibility, attractiveness and networking to encourage the application of broader strategies in research, development and knowledge[13,14,15,16].

The past six decades or so were virtuous in the evolution of these organizations. The history of humanity and the phenomena occurring in this short period of time offered threats and opportunities to all organizations, particularly to STPs. Factors are accepted in this context: the conformation of the knowledge society, globalization, developments in ICT and a new structure of global economy. Innovation presents itself as one of the vectors that support the development of STPs, both worldwide and in Brazil. Innovation is the result of a complex system involving many actors, with the focus as a result of offering a new product or process to market. To this end, STPs formed in environments conducive to innovation and, for this simple reason, have been presented as entities with strong potential to compose systems of innovation in their various levels and dimensions.

In a historical perspective, studies show that the evolution of STPs can be translated into several visions[11,17]. On one hand, can be seen from a historical approach, from the synergy of three generations of STPs: Pioneers (1950-1970), Followers (1970-1990) and Structuring (1990 onwards). And secondly, from three evolutionary stages: Science Push, Market Pull and Interactive Local Flows – according to the European Commission.

The period in which it notes the birth and evolution of STPs may also be associated with the emergence of structural and political actions aiming at the development supported by the creation, codification and diffusion of knowledge and innovation. Instruments and mechanisms were created to emulate and support these actions, guided by a different economic scenario, whose assets measurement challenges indicate its intangibility. In this context, it presents the need to visualize this scenario, identifying, clearly and carefully, a taxonomy – new and adhering to STP´s environment – which may assist in defining strategies for action and the consequent decision making.

In recent studies for the Brazilian context of STPs, research (Vedovello, 2008; ABDI, 2008) suggest the adoption of a taxonomy as a way to support the structuring of public policies, considering strategies for development, promotion and investment in STP´s sector, based on four guiding principles for analysis:

- Axis Qualification: Science and Technology Bases or Business Base;
- Axis of Relevance: World / National, Regional or Local;
- Axis Categorization: Consolidated or Emerging;
- Axis Structuring: Planning, Implementation, Operation or Expansion.

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[11] VEDOVELLO, Conceição; MACULAN, Anne-marie Delauney; JUDICE, Valéria M. M.. **Projeto de Acompanhamento dos Parques Tecnológicos Financiados pela FINEP.** Rio de Janeiro: Finep, 2006. 126 p.

[12] EUROPEAN COMMISSION (EC). **Regional Research Intensive Clusters and Science Parks.** Belgium (Brussels): European Communities, 2007. 152 p. Available in: http://www.eeda.org.uk/1613.asp .

[13] IASP (International Association of Science Parks). Available in: http://www.iasp.ws

[14] UKSPA (United Kingdom Science Parks Association). Available in: http://www.ukspa.org.uk/home

[15] ASPA (Asian Science Park Association). Available in: http://www.aspa.or.kr/eng.

[16] AURP (*Association of University Research Parks*). Available in: http://www.aurp.net

[17] BIGLIARDI, Barbara et al. **Assessing science parks' performances: directions from selected Italian case studies**. Technovation, Elsevier, v. 2006, n. 26, p.489-505, 01 abr. 2006. Available in: http://dx.doi.org/10.1016/j.technovation.2005.01.002 .

As requirements for such studies is the knowledge of the objectives of the STP, its main stakeholders and its key success factors, according to GIUGLIANI (2011). With a view to the development of STPs, in these multi-level strategic approach, management structures highlight in importance and, still in the beginning, the structures of governance for STPs.

4. Corporate Governance (CG)

On the strict sense, may be said that a model of corporate governance requires greater transparency of business and respect the rights of shareholders. According to Grün [18], could be accepted that good corporate governance would be instrumental in sparking a virtuous cycle, ensuring a better environment and providing institutional investors with the fate of their applications at risk. In a historical perspective, Carlsson[19] suggests that the nineteenth century was the time of 'entrepreneurs', the twentieth century, the time of 'managers', and the twenty-first century is the era of 'corporate governance', defined as well face the relevance of power to be exercised by corporations in the world. In a more recent time frame, the advent of governance is in line with globalization, gathering its followers and also its critics.

In the traditional model, based on a capitalist economy, companies are focused on creating technology, increasing productivity and creating wealth[20]. In a time of transition to a knowledge-based economy, creation and innovation are added to knowledge. The growth of markets and new objectives of the companies promoted the need for adequate sources of financing and the development of capital markets one of the most visible support for the development of corporations today, at which time the role of manager of the company has no longer necessarily be exercised by the owner. These papers, now distinct (owner and manager), have their origin in the spray stake (many owners) of corporations and implied a consequent need to avoid spraying power (a few managers). For this, new mechanisms are gaining ground in business structure, obtaining a faster growth in countries that already had a clearer set of laws, regulations, rules and guidelines, especially with the capital market. All these mechanisms gives what is conceived as Corporate Governance, thus seeking a higher and better align the interests of shareholders and managers, making these group´s focus of action convergent with the interests of shareholders, namely, the search of wealth´s maximization from what was invested.

The challenge of balancing the interests of shareholders and managers brings the debate to the Agency Theory[21]: relationships and conflicts between 'Principals' and 'Agents'. Principals are defined as shareholders, investors and creditors. Agents are identified as those representing the interests of the Principals, also known as managers. This problem arises because of the compulsory separation of ownership and control and the occurrence of misalignment in the Principals' activities with the Agents' activities. That is why these (the Agents) are hired.

This being so, concepts of Governance, in the broadest sense, emerge, as well as concepts of Corporate Governance in the strictest sense, which contribute to a better understanding of the profound change that is taking place in contemporary corporations. According to Shleifer and Vishny [22], Corporate Governance is the set of means by which the Principals (shareholders and investors/creditors) of a corporation ensure a return of their investment.

The reference document "The OECD Principles of Corporate Governance" [23] considers corporate governance as a set of relationships between the company's management, its board of directors, shareholders and other stakeholders with relevant interests. The principles adopted by the OECD and its member countries have become an international benchmark for good corporate governance

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[18] GRÜN, Roberto. **Atores e ações na construção da governança corporativa brasileira.** Revista Brasileira de Ciências Sociais, São Paulo, v. 18, n. 52, 2003. Available in: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-69092003000200008&lng=en&nrm=iso .

[19] CARLSSON, Rolf. **Ownership and value creation: strategic corporate governance in the new economy**. 1.ed. New York: John Wiley & Sons, 307 p. 2001.

[20] SILVEIRA, Alexandre Di Miceli da. **Governança Corporativa, Desempenho e Valor da Empresa no Brasil.** 2002. 165 f. Dissertação (Mestre em Administração) - Curso de Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto da Universidade de São Paulo, Departamento de Economia, Universidade de São Paulo, São Paulo, 2002.

[21] JENSEN, M.C.; MECKLING, W.L. **Theory of the firm: managerial behavior, agency costs and ownership structure.** Journal of Financial Economics, n. 3, p. 305-360, 1976. Available in: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=94043 .

[22] SHLEIFER, Andrei, VISHNY, Robert. **A survey of corporate governance.** Journal of Finance. v. 52, n. 2, p. 737-783, 1997.

[23] OECD. **Principles of Corporate Governance.** 2004. 69 p. Available in: http://www.oecd.org/dataoecd/32/18/31557724.pdf.

practices, serving as a basis for the Brazilian context[24]. Table 1 lists these principles incorporated in this research as requirements to be met within the context of good governance practices.

Table 1: Principles of Corporate Governance

PRINCÍPLES OF CORPORATE GOVERNANCE	
OECD Principles (Global)	**IBGC Principles (Brazil)**
Ensuring the Basis for an Effective Corporate Governance Framework The Rights of Shareholders and Key Ownership Functions The Equitable Treatment of Shareholders The Role of Stakeholders in Corporate Governance Disclosure and Transparency The Responsibilities of the Board	Transparency Equity Accountability Corporate responsibility

In this sense, the non-observance of these principles offers the possibility of opportunistic behavior (moral hazard) and the occurrence of conflicts between the various actors, thus giving rise to the so-called 'agency problem'. For this article, we adopted the concept of Corporate Governance outlined by Silveira (2002):

> Corporate Governance is the set of internal and external mechanisms that aim to harmonize the relationship between Shareholder and Agent, given the separation between ownership and control.

As internal mechanisms, we can highlight the Board of Directors, and as external mechanisms, one can cite the disclosure of periodic information about the organization, for example.

Based on several studies[25,26] aimed at companies tied to the capital market, one can see, even if it is still preliminary, a broader approach to corporate governance, also turned to outside organizations for this market, indicating a virtuous circle of corporate governance, with these stages: the pursuit of maximizing the interests of the shareholder, protecting investors, costs reduction for access to resources, more attractive investments, increasing levels of development and competitiveness, along with guarantees control and monitoring actions. The observation of this cycle becomes relevant to improving the competitiveness of enterprises, adding the concepts and good corporate governance practices with a view to their growth and their sustainability in a market characterized by globalization.

Adherence to this focus organizations typified as STPs – knowledge-intensive – has the merit of enhancing the goal of these organizations, with worldwide recognition, currently offer strong potential to act as a major factor of development based on knowledge and innovation.

[24] IBGC (Brazilian Institute of Corporate Governance). **The Best Practices Code of Corporate Governance.** 3a Edição. São Paulo: IBGC, 2004. 48 p. Available in: http://www.ibgc.org.br/CodigoMelhoresPraticas.aspx .

[25] SILVEIRA, Alexandre Di Miceli da. **Governança Corporativa e Estrutura de Propriedade:** Determinantes e Relações com o Desempenho das Empresas no Brasil. 2004. 254 f. Tese (Doutor em Administração) - Curso de Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto da Universidade de São Paulo, Departamento de Administração, Universidade de São Paulo, São Paulo, 2004.

[26] PEEBLES, Douglas A.. **Corporate Governance and Firm Performance:** The influence of structures, processes and information technology. 2007. 293 f. Tese (Doctor Of Philosophy) - Capella University, Minnesota, 2007. Available in: < http://proquest.umi.com/pqdlink?Ver=1&Exp=05-19-2015&FMT=7&DID=1296102051&RQT=309&attemPCT=1 >.

5. Governance Model for Science and Technology Parks in Brazil

5.1 Organizational Structure

The proposition Governance Model for STPs requires the establishment of higher levels of external front of the specific structure of a STP, mainly linked to the management of this type of organization, adding to its functional structure the positioning of Corporate Governance Structures (CGS).

With the objective to support this proposal and adjust its approach to an environmental analysis and interpretation (GIUGLIANI, 2011), taxonomy itself was adopted in order to facilitate the identification of the morphology of the governance model being proposed. This categorization is segmented into six distinct hierarchies, becoming normative for this work. Table 2 describes this taxonomy, illustrating the transverse approach with a view to achieving results.

Table 2: Taxonomy's Approach

Level	Dimension	Fields of Analysis	Items	Weight	Factor
1 Shareholders	1.1 General 1.2 Specific 1.3 STP				
2 CGS Corporate Governance Structures	2.1 Decision Making 2.2 Governance Mechanisms 2.3 Agency Problems	2.1.1 2.2.1 2.2.2 2.2.3 2.2.4 2.2.5 2.2.6 2.2.7. 2.2.8 2.3.1.	... 2.2.3.1 2.2.3.2 2.2.3.3	2.2.3.2.1	2.2.3.2.1.1
3 STP Science and Technology Park	3.1 Developer 3.2 CT&I				

The concepts of these various categories are described below:

- Levels: define the environment of the macro structure of a STP, adding complementary approaches to the Functional Structure of a STP, in order to support the proposition of a Model of Governance for STPs.
- Dimensions: stratification of each level with a view to their better identification of actors and activities.
- Field of Analysis: adopted specifically for the deepening of level 2 and its dimensions, supported by the dimensions of levels 1 and 3, in order to structure the Model of Governance for STPs.
- Items: questions evaluated internally at each Field Analysis, each weighted item from your 'weight' and 'factor' within their field.
- Weight (W): variable weighting of each item within each field of analysis. Its value is set in the range 0-100% (0.00 to 1.00), totaling up to 100% (1.00) for the sum of all items in each field.

- Factor (F): variable valuation of each item, given the results of qualitative analysis to be based on the instrument itself. Its value can have variation in the range of '0 'or '1' to closed questions, or in the range of '0 'to '1' to open questions.

Figure 3 shows the structure of this macro framework, indicating the various levels according to the taxonomy proposed to be added to the organizational model of a STP.

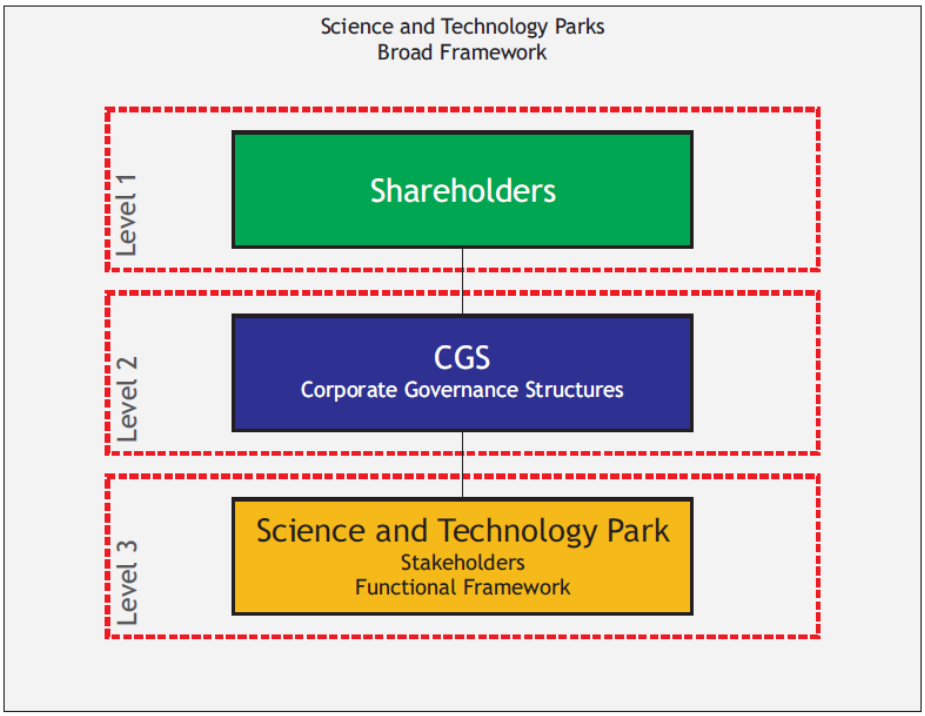

Figure 3: STP macro framework

The indicated Level 1 has as goal to assemble the shareholders' section of the organization, those for whom the results should primarily serve their interests, supported in maximizing the resources invested. This level will be approached from three dimensions where organizations or individuals are included in the condition of Shareholders, Investors, Lenders and Maintainers, and others to maintain interest in investing in the organization and obtain profit.

Level 2 aims to bring together the CGS, represented by a set of three dimensions – Decision Making, Governance Mechanisms and Agency Problems - that focus on the coordination of relations between the Shareholders and the Agents of the organization. The focus of the action becomes the risks involved in compulsory decision-making, aiming, on the one hand, the wealth maximization of the Shareholders or otherwise, even if improper, the maximization of personal interests of agents, generating many situations of agency problems, damaging the organization. Is in this context that governance mechanisms are inserted, seeking to align the interests of the organization.

Level 3 is devoted to the functional aspect of the organization that is the object of this study – STPs, starting to identify, from this context, the stakeholders involved and the variables related to this organizational environment. It is presented from two dimensions - Incorporator (Management of Physical Space) and ST&I (Management of Science, Technology and Innovation Policies) - which anchor the context of their functional structure.

The theme of corporate governance has been object of analysis and studies using a variety of scientific methodologies, by approaches that travel between the areas of Social Sciences and Humanities. The literature presents analyzes based on case studies and econometric measurements, aiming to correlate the variables in organizational governance, exogenous or endogenous (Silveira 2002, 2004, Peebles, 2007).

The focus of this research aimed to set the CGS that compose the Level 2 shown in Figure 3. Figure 4 identifies its three dimensions of analysis, suggesting the next steps to be addressed, where these dimensions offer support to the alignment of interests between Shareholders and Agents, and supports the configuration of the model that is being proposed.

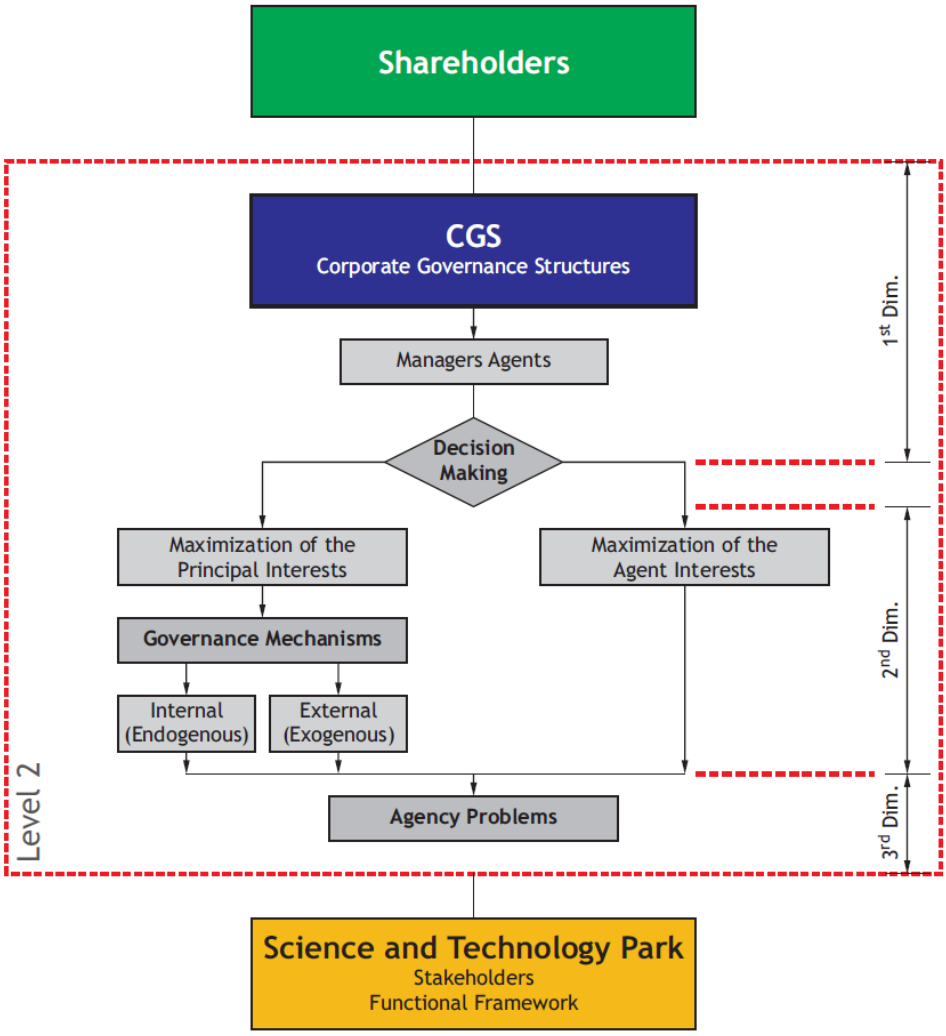

Figure 4: Configuration of Corporate Governance Structures (CGS)

In first dimension, the analysis of the Process of Decision Making gains relevance in this context. According to Fama and Jensen[27], the current view is that the decision-making power is concentrated in the entrepreneur of a company, disregarding the analysis of the steps that compose this process. As with corporations, where there is separation between ownership and control, in the STPs, those responsible for the management are not directly burdened by the loss of performance of the organization due to its decisions, indicating that these control decisions may in fact be allocated to

[27] FAMA, Eugene F.; JENSEN, Michael C.. **Separation of ownership and control.** Journal Of Law And Economics, Chicago, v. 26, n. 2, p.301-325, jun. 1983. Available in: http://www.wiwi.uni-bonn.de/kraehmer/Lehre/SeminarSS09/Papiere/Fama_Jensen_Separation_ownership_control.pdf .

another level, specifically that one composed by the Board of Directors, effectively responsible for sustainability and survival of the organization (Silveira 2002, p. 50).

In the context of the second dimension, making the set of Governance Structures, there are the Mechanisms of Governance. The Internal Mechanisms bring together endogenous control and monitoring initiatives to the organization and in turn able to have more planning, control and predictability of their actions. External Mechanisms are related to the external environment of the organization, susceptible to environmental restrictions, not always accessible to organizations and with emergent characteristics, depending, for example, on social and economic fluctuations linked to a market now dependent on a global environment.

The third dimension encompasses the context of the clash between the Decision Making, by agents, and the results achieved, which may create a possible conflict environment in organizations. It is in facing these Agency Problems that is the implementation of the mechanisms mentioned in the previous dimension, burdened by Agency Costs, in order to maximize the interests of Shareholders, minimize conflicts between Shareholders and Agents and promote greater alignment of actions between shareholders, managers and stakeholders.

5.2 Fields of Analysis of Governance

Based on the proposition of models of Corporate Governance for the area of ICT[28,29,30], there is the goal of the CG to ensure the return on investment, making relevant the role of control and measurement, particularly in order to measure successes and failures in governance practices. In this context, it is appropriate to use quantitative and qualitative methods to evaluate the performance of governance.

The Governance Model for STP that is object of this study, based on its own morphology and taxonomy, proposes a broader approach from Field of Analysis of Governance, focusing on the organizational environment of STPs. The three dimensions of CGS are described to hold ten Fields of Analysis of Governance, as described in Table 3. The model seeks to identify actions which, if implemented in its entirety, may suggest the existence of an organizational structure focused on Corporate Governance, attentive to its principles, concepts, objectives and results.

Table 3: Fields of Analysis of Governance

[28] RAGHUPATHI, W. "RP". **Corporate governance of it: a framework for development.** Communications of the ACM 50, no. 8: 94-99, 2007. Academic Search Premier, EBSCOhost. Available in: http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=26047940&lang=PCT-br&site=ehost-live

[29] NOLAN, 2005 NOLAN, Richard; MCFARLAN, F. Warren. **Information Technology and the Board of Directors.** Harvard Business Review. p.1-12, out. 2005. Available in: http://www3.fsa.br/LocalUser/gestaoti/Ativ03%20NOLAN%202005%20%20Information%20Technology%20and%20the%20Board%20of%20Directors.pdf .

[30] HENDERSEN, J. C.; VENKATRAMAN, N. **Strategic alignment: Leveraging information technology for transforming organizations.** IBM Systems Journal, USA, v. 38, n. 2&3, p.472-484, 1999.

FIELDS OF ANALYSIS OF GOVERNANCE	
1st Dimension	
1	Decision Making Process
2nd Dimension	
2	Board of Directors: Roles and Responsibilities
3	Board of Directors: Composition, Size and Remuneration System
4	Board of Directors: Gender Diversity
5	Chair and CEO: distinction and duality
6	Oversight Committees: Auditorship, Remuneration and Nomination
7	Interconnected Boards
8	Ownership Structure
9	Comptroller
3rd Dimension	
10	Agency Problems

In this approach, the weights and factors described in the proposed taxonomy are listed in a generic way, as much as for each field as for each item, identified by W, the weight to be assigned to each item; F, factor to be assigned to each item, and FW, the weight to be assigned to each field.

Field 1: Decision Making Process

The identification of the steps of Decision-Making Process allows better allocation of players and responsibilities. There are four steps, two under the responsibility of the Board of Directors (Ratification and Monitoring) and two of Managers (Initiation and Implementation). In the analysis of this Field 1, questions were developed in order to identify the steps of decision making processes, adopting weights on the items proposed. Table 4, specific for Field 1, illustrates a similar procedure adopted for the other fields.

Table 4: Field of Analysis 1 - Decision-Making Process - Items

Field 1 (F1)			
	Items	**Weight**	**Factor**
1	Identification of a Decision Making Process (DMP)	W1	F1
2	Identification of distinction between the Control and Management processes	W2	F2
3	Identified steps in Decision Making Process (*) (*) Factor according to the following table: Factor = DMP2/DMP1	W3	F3
	DMP1 indicated: 4 — DMP2 identified: ___		
	( ) 1. Iniciation of actions		
	( ) 2. Ratification of actions to take effect		
	( ) 3. Implementation of actions		
	( ) 4. Monitoring of actions		
	Total	**WF1**	

Field 2: Board of Directors (BD) - Roles and Responsibilities

The Board of Directors is often confused with the figure of Governance. The Board is a key element in a system of governance, but it is not the only one. Its roles and independent actions may not overcome other mechanisms that compose the CG. The main objective of the Board's action is to minimize problems and agency costs between Shareholders and Agents.

Field 3: Board of Directors - Composition, Size and Remuneration System

This field focuses three relevant mechanisms directly related BD: (3.1) Composition, related to the origin of the members of BD; (3.2) Size, related to the total number of members that composes it; and (3.3) Remuneration System, characterizing its existence and its connection with the previous mechanisms.

Field 3.1: Board of Directors - Composition

Related to the origin of the members of BD and their relationships with the organization. It will be treated under the focus of more or less independence of its members in relation to the company, composing three classes of directors:

- Independent: councilors without any kind of relationship with the organization, being hired through formal processes of selection;
- External: counselors who do not maintain current relationship with the organization, but are not considered independent because they have maintained business relationships with the company;
- Internal: counselors linked to the company, directors or employees.

For this governance mechanism, we considered the importance of the BD's composition being formed by the three indicated classes and recommended that each class presents a moderate participation.

Field 3.2: Board of Directors - Size

In any decision-making group is very likely that their size affects the results. On the one hand, a very small group restricts a wider variety of inputs to the process and, by the other hand, a very large group presents difficulties to generate conclusions from many inputs and opinions throughout the process of decision making. Was considered desirable and recommended size the reference indicated by IBGC, with the number of members of the BD ranging between 5-9.

Field 3.3: Board of Directors - Remuneration System

The establishment of a remuneration policy should be primary task of the Board of Directors of the company, regulating and minimizing the risk of an overpayment for both the CEO and other executives of the company. Considering the importance and influence of this mechanism of governance in the context of Corporate Governance, the items evaluate its existence and form of effective.

Field 4: Board of Directors - Gender Diversity

There are not many studies about the relation of gender diversity in the composition of the Board of Directors[31,32]. Broadly speaking, could be addressed in the context of male, female, Indian, yellow, black, and others. With a focus on male and female duality, researchers found that there are differences when women also compose the Board or when it is composed entirely by male members. Studies identify a positive relation between proportion of women in the Board and the rise of the value of the company. In this Field we analyzed the occurrence of Gender Diversity (male and female), showing as desirable a balanced proportion of the genders considered on the Board composition.

Field 5: Chair and CEO: Distinction and Duality

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[31] CARTER, D. A.; SIMKINS, B. J.; SIMPSON, W. G.. **Corporate governance, board diversity, and firm value.** Financial Review, v. 38, n. 1, p.33-53, 2003. Available in: <DOI: 10.1111/1540-6288.00034>.

[32] BROWN, David A. H.; BROWN, Debra L.; ANASTASOLPOULOS, Vanessa. **Women on boards:** Not just the right thing. But the "bright thing". Organizational Excellence, Ottawa, p.1-17, 1 maio 2002. Available in: http://www.europeanpwn.net/files/women_on_boards_canada.pdf .

The activities of the President of the Board and Chief Executive Officer (CEO) of a company are clearly identifiable and distinct in its design and scope. While the first one is more closely tied to strategic issues, the second one is identified to the operational focus. This mechanism is analyzed by the identification of the distinction and the duality of these positions.

Field 6: Oversight Committees: Auditorship, Remuneration and Nomination

According to Peebles, the Board may be more effective in its actions when some of its responsibilities are handled by committees of the board. Most codes of governance reveals the importance of these committees and independent board members, recommending, for example, that the committees of Auditorship, Remuneration and Nomination Committee should be, as a priority, consisted of independent members. Within the scope of this research, these committees were analyzed in order to adopt good governance practices in the organization.

Field 7: Interconnected Boards

According to Mizruchi[33], the connection between boards occurs when one of its members acts simultaneously on another board. This connection can occur both in terms of depth (number of interconnected companies) or length (number of participating members of several boards of companies). In order to evaluate this governance mechanism, the phenomenon of board interconnection is discussed observing the context of depth and length.

Field 8: Ownership Structure

According to Silveira (2004), the ownership structure is a key governance mechanism, indicating if the relation between ownership concentration and corporate performance is presented as positive. When there is not enough to guarantee legal protection to small investors and minority shareholders to apply their resources, is required the presence of more concentrated control from large shareholders and large investors as a way to enable the effective control of the company. The characterization of this relevant mechanism is dependent on endogenous or exogenous variables, and various underlying factors, making a positive relation between Ownership Structure and performance to vary from case to case.

Field 9: Comptroller

One of the principles of Corporate Governance to be followed by good governance is Transparency, contributing to an effective reduction of informational asymmetry between those who generate and use information. Assuming the transversality of the control mechanisms in the organizational context, three areas are evaluated within the context of governance:

- Operational Area: Sets up from the deployment of tools to support management processes and decision making, seeking a better way to achieve the organizational objectives.
- Physical and financial area: Set up from recording instruments and control of all the facts which result in economic and financial results for the organization.
- Prescriptive Area: Comprises a set of codes, rules and regulations made in order to organize and standardize the organizational environment at all levels, providing greater transparency to the conduct of its employees. Allows mitigation of fraud risks or operational failures, monitoring of agency conflicts and traceability of all operations within the organization[34].

[33] MIZRUCHI, M. S.. **What Do Interlocks Do?** An Analysis, Critique, and Assessment of Research on Interlocking Directorates. Annual Review Of Sociology, v. 22, n. 1, p.271-298, ago. 1996. Available in: http://www.tue-tm.org/INAM/mizruchi-1996.pdf .

[34] BERGAMINI JúNIOR, Sebastião. **Controles Internos como um Instrumento de Governança Corporativa.** Revista do BNDES, Rio de Janeiro, v. 12, n. 24, p.149-188, dez. 2005. Available in:

Field 10: Agency Problems

Based on largely consecrated theories, many researchers support their premises on the Theory of Agency and its focal point, organizational efficiency and risk management. It is in facing these "problems" that the shareholders take actions in order to minimize the divergence of interests and increase the alignment, imposing "agency costs" to the company to implement control actions. For the evaluation of good governance practices in this Field adhering items to these actions have been proposed.

5.3 Instruments of Evaluation and Analysis of Governance

In order to conduct this research, constructed in a purposeful way within the context of Science and Technology Parks and Corporate Governance, two instruments were developed, the first one with quantitative and the second one with qualitative focus. They were applied to a number of organizations identified in the step Verification of this study.

The Qualitative Instrument was designed as a support to the interviews that evaluate the CG in the organizations that compose the sample, and it is divided into two parts. Its main objective is to consolidate the approach of the Fields of Analysis of CG of the organization from items that intend to better identify its existence, occurrence and extent.

The Quantitative Instrument searches for systematize the analysis of the previous instrument on comparable parameters, from quantitative analysis, and, with the support of a Radar Chart, graphically present the results.

Figure 5 illustrates a general representation of this analysis for each element of the sample.

STP CORPORATE GOVERNANCE
Quantitative Instrument
FIELDS OF ANALYSIS OF CORPORATE GOVERNANCE

GRAPHICAL ANALYSIS

		Fields of Analysis of CG
1	Decision Making Process	0,00
2	Board: Roles&Responsabilities.	0,00
3	Board: Comp-Size-Remuneration	0,00
4	Board: Gender Diversity	0,00
5	Chair and CEO	0,00
6	Oversight Committees	0,00
7	Interconnected Boards	0,00
8	Ownership Structure	0,00
9	Comptroller	0,00
10	Agency Problems	0,00

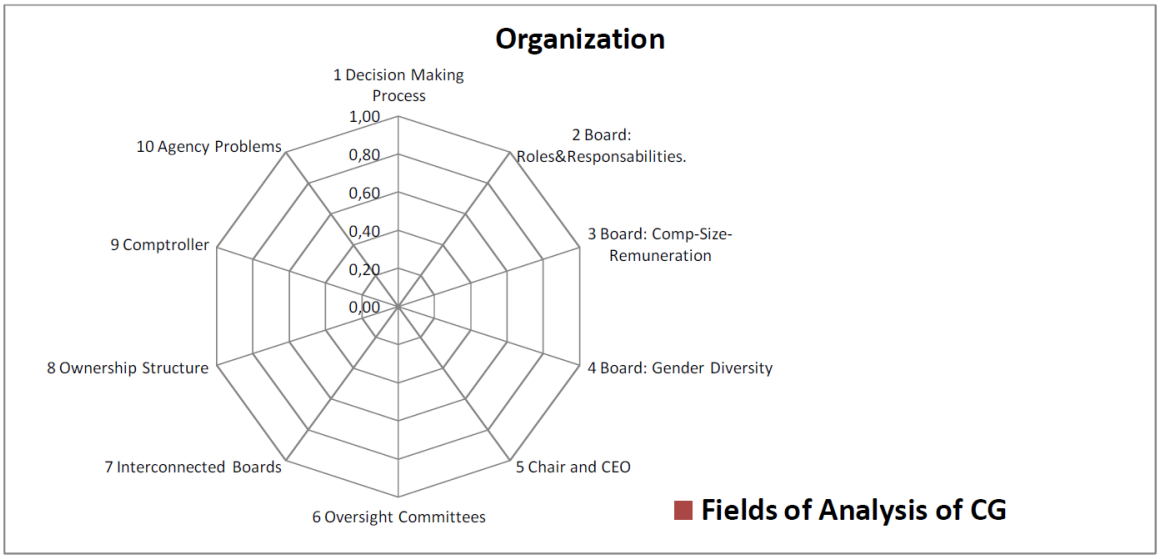

Figure 5: Representation of Fields of Analysis of Corporate Governance in an organization

6. Verification of the Governance Model

The Verification of the Model of Governance for STPs in Brazil, proposed from the application of Qualitative and Quantitative instruments, was effected to a sample of four Brazilian organizations.

As a reference company in the context of Corporate Governance (Case 1), was invited Grendene SA[35], which operates both on the national and world markets, and holds an organizational structure that adheres to the concepts of Corporate Governance recognized worldwide.

The other organizations participating in this study belong to the context of STPs (Cases 2, 3 and 4). Of those, two are currently in full operation, according to the classification adopted by ANPROTEC[36], the TECNOPUC[37] and TECNOSINOS[38], chosen for their strategic relevance in the Brazilian scientific and technological environment. The third, the SAPIENS Park[39], currently being implemented and already partially operating, relies on innovative design for its organizational structure. All of these cases have in common effective action to help ensure that they are recognized as drivers of development based on knowledge and innovation.

The proposed verification by the research with the constitution of this sample, as well as the application of the instruments 01 and 02, showed strong contributory potential to the study, offering different perspective to the design of a Model of Governance for STPs based on the adoption of the Fields of Analysis of Governance Model.

The representation of adherence to the Fields of Analysis of Governance for each evaluated organization is shown in Figure 6, from the results obtained by using the quantitative instrument.

The case by case analysis allowed a judicious comprehension of the structural context of each organization, evaluating items related to Corporate Governance in its organizational context. The transversal comparative analysis, having on one side the reference company - Grendene S.A - and on the other three STPs - TECNOPUC, TECNOSINOS and SAPIENS Park – allowed a better contextualization of the convergences and disparities under a critical insight into the environment of governance and its requirements as organizational structure. Field 1 (BD), Field 8 (Ownership Structure) and Field 9 (Controllership) showed strong adherence to good CG practices. In the case of Fields 2 and 3, linked to the Board of Directors, moderate adherence was recorded, reflecting a relative uniformity in the performance of the entire sample compared to the presented items. The Fields that was found lower adherence to the proposed items, as Field 4 (Gender Diversity) and Field 6 (Committees of Supervisors), suggest the possibility that they will be re-contextualized, not for its relevance, but mainly for its relative weight when compared to others that have recognized potential of offering higher impact factor. In contrast, the other fields, Field 5 (Distinction and CEO Duality), Field 7 (Interconnected Boards) and Field 10 (Agency Problems), partially satisfied the evaluated items, presenting, case by case, significant variability in relation to structural and endogenous characteristics of the members of the sample.

[35] Grendene S.A., www.grendene.com.br

[36] ANPROTEC, NATIONAL ASSOCIATION OF ORGANIZATIONS PROMOTING INNOVATIVE PROJECTS. Available in: http://www.anprotec.org.br/

[37] TECNOPUC, STP of the Pontifical Catholic University of Rio Grande do Sul, RS, Brazil. Available in: http://www.pucrs.br/agt/tecnopuc/

[38] TECNOSINOS, STP of São Leopoldo, RS, Brazil. Available in: http://www.tecnosinos.com.br

[39] SAPIENS Parque, Florianópolis, SC, Brazil. Available in: http://www.sapienspark.com.br/

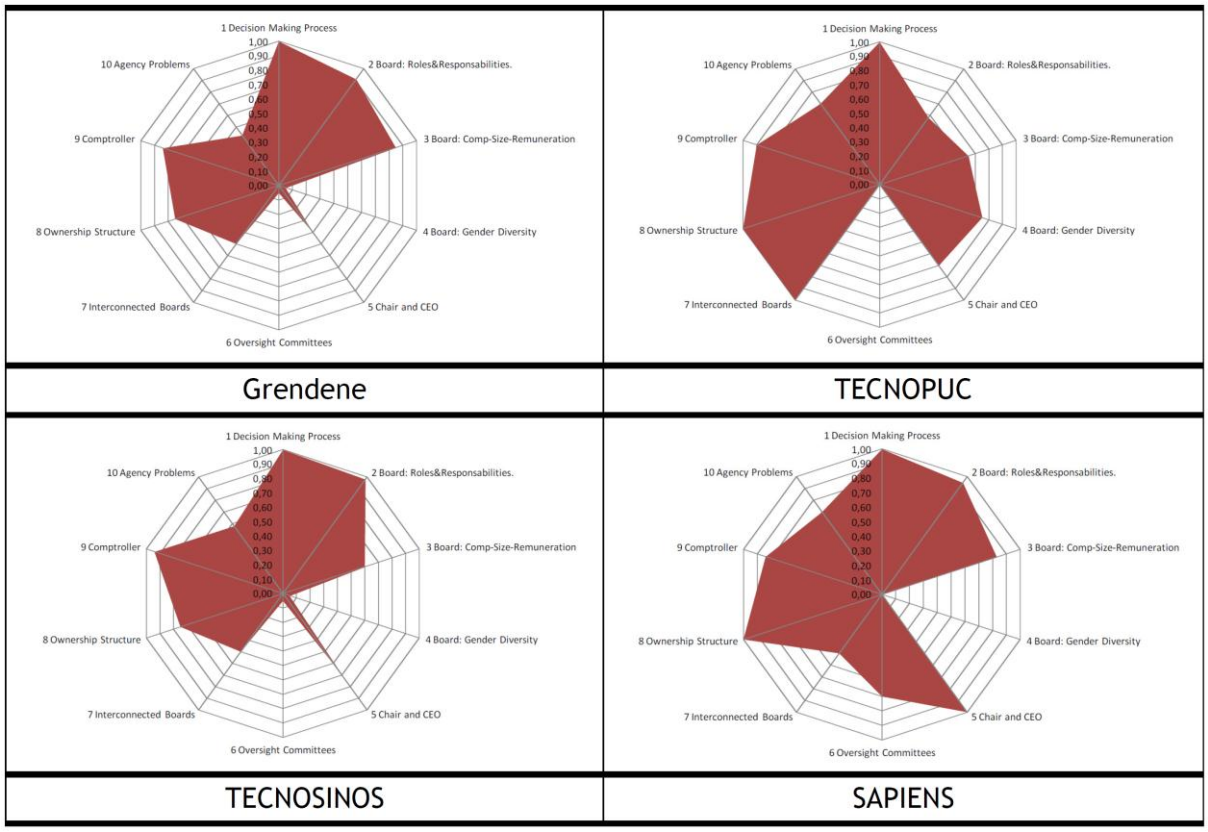

Figure 6: Field of Analysis of Governance for the assessed organizations

Figure 7 below illustrates the occurrence of the various Fields of Analysis for the four cases studied, considering the proposed variation to the Fields between 0.00 and 1.00.

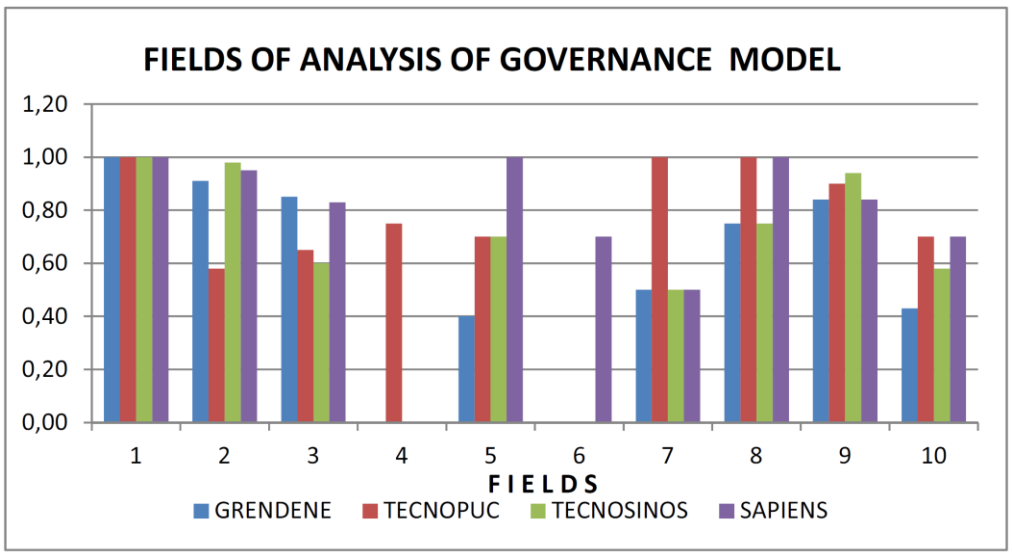

Figure 7: Representation of the Fields of Analysis of Governance for the entire sample.

7. Conclusions

The results lead to very positive conclusions: the feasibility and the importance of the approach of the organizational structure of the STP from a broader perspective, in addition to the relevant demands of management, including in this context the CG; the comparative appraisal of the Field Analysis Model of the Governance in face of the benchmark company's performance and the assessed STPs implies convergence, offering proximity and similar trends, despite the STPs not having the formal requirements of compliance with governance requirements. In our model, all fields of analysis always punctuated, also suggesting its relevance and comprehensiveness.

Figure 8 shows the extract achieved by research, positioning compared Field Analysis of Governance for the two sets evaluated on a benchmark company - Grendene SA - and another on the STPs, with their average performance and their trend of convergence.

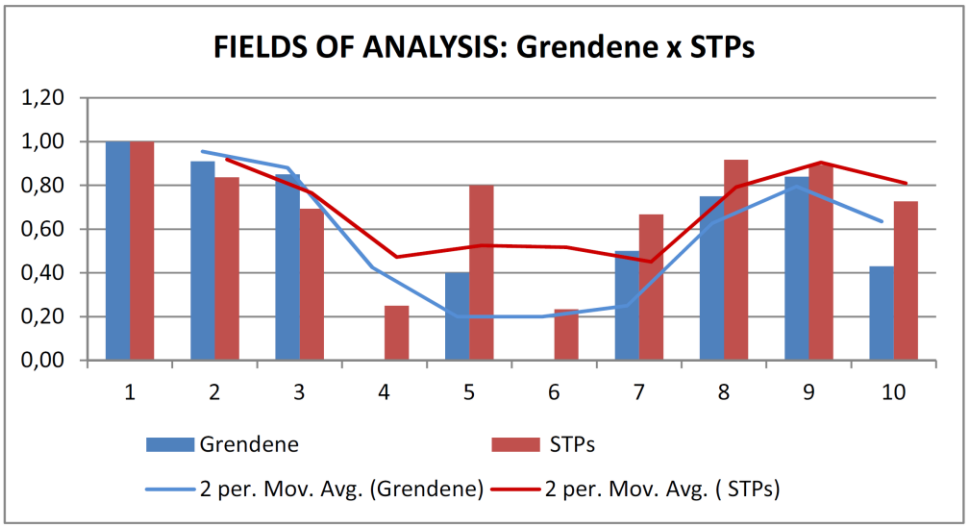

Figure 8: Representation of Fields of Analysis of Governance: Grendene x STPs.

Figure 9 rescues the previous representation on the Radar Chart and illustrates the average performance of all STPs in the Model Field Analysis of Governance, where all Analysis Fields scored.

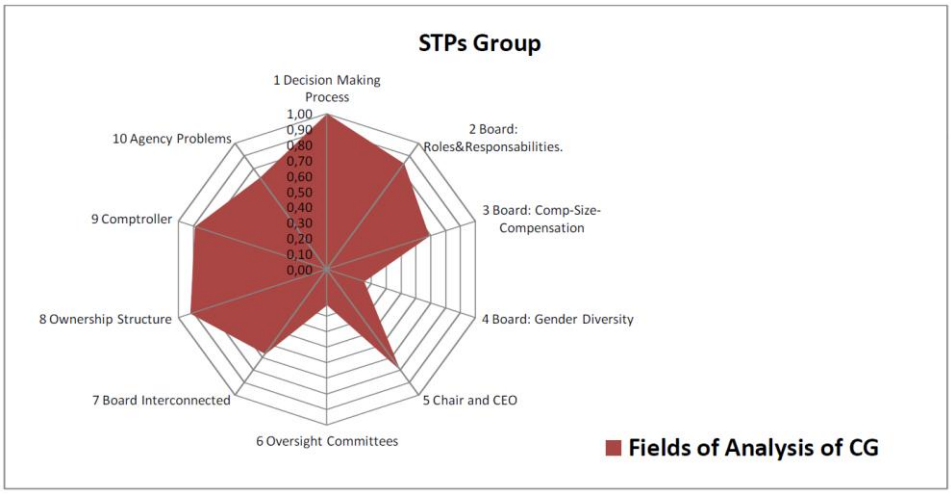

Figure 9: Representation of Fields of Analysis of Governance for the STPs Group

Based on these findings we can infer that the organizational structures studied would benefit from a re-configuration to meet the criteria for CG best practices. Thus, the adoption of concepts of Corporate Governance by STPs, with the implementation of the Field Analysis of Governance Model, it could mean valuable achievement for the consolidation of a new organizational structure, enhancing the performance, giving more value, increasing the attractiveness of investments, and ratifying the STPs as effective vectors of development based on knowledge and innovation, its transformative vocation.