

INSTITUTIONALIZING THE CONCEPT OF SUSTAINABILITY FROM A TETRALOGICAL PERSPECTIVE: THE CASE OF PRO-GUAÍBA

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Abstract

The objective of this study was to integrate Morin's complex tetralogical model and neoinstitutionalism in organizational analysis theory in order to analyze the performance of the Pro-Guaíba Program in institutionalizing the concept of sustainability in an organizational field of twelve co-executor institutions in the Guaíba Watershed Region of Brazil. In order to achieve this, both documentary research and in-depth interviews were conducted with the purpose of finding information to be categorized according to previously defined theoretical constructs. The data analysis was performed through content analysis. As a result, it was possible to obtain a complex and neoinstitutional description of the role of the program in creating the necessary interactions among these institutions in order to structure a sustainable organizational field and, thus, to institutionalize the program's concept of sustainability.

Keywords: Neoinstitutionalism. Complexity. Sustainability. Organizational fields. Edgar Morin.

A Institucionalização do Conceito de Sustentabilidade por uma Perspectiva Tetralógica: o caso Pro-Guaíba

Resumo

Objetivo deste estudo foi integrar o modelo tetralógico da complexidade de Morin e a teoria neoinstitucionalista de análise organizacional para analisar o papel do Programa Pró-Guaíba na institucionalização do conceito de sustentabilidade em um campo organizacional de onze instituições co-executoras na Região Hidrográfica do Guaíba, no Brasil. Para isso, pesquisas documentais e entrevistas em profundidade foram conduzidas com intuito de encontrar informações e categorizá-las de acordo com construtos teóricos previamente definidos. Para a análise de dados foi empregada a análise de conteúdo. Como resultado, foi possível obter uma descrição neoinstitucional e complexa do papel do programa em criar as necessárias interações entre estas instituições de forma a estruturar um campo organizacional sustentável e, enfim, institucionalizar o conceito de sustentabilidade proposto pelo programa.

Palavras-chave: Neoinstitucionalismo. Complexidade. Sustentabilidade. Campos organizacionais. Edgar Morin.

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Introduction

Pro-Guaíba is the State Government of Rio Grande do Sul's (Brazil) program for ecological sustainability and social development of the Guaíba Hydrographic Watershed Region (NORONHA, 1998; RIO GRANDE DO SUL, 2001). The Pro-Guaíba program is known for a variety of reasons, one of which is its size as it contains more than 250 cities or 30% of the state territory, and more than 6 million inhabitants. In addition, its longitudinal dimension is impressive, as the program was conceived in 1989 with a projected length of more than 20 years. The total public investment was USD 220.5 million, 60% of which was financed by the Inter-American Development Bank and 40% by local state funds. However, Pro-Guaíba was not chosen for this study because of its notable scope but rather because of two institutional problems: (a) a *conceptual problem* related to the necessary institutionalization of Pro-Guaíba's concept of sustainability; and (b) a *pragmatic problem* related to the program's strategy to institutionalize this concept into the practice of a group of different co-executor institutions. This study supposes that these two aspects have the dual effect of structuring and restructuring as well as of institutionalizing and deinstitutionalizing Pro-Guaíba's definition and actions of sustainability dialogically with the institutions in the field in order to guarantee the development and permanency of the program.

Regarding the conceptual problem, the Rio Grande do Sul state government created the Pro-Guaíba Program by Decree nº 33.360 (RIO GRANDE DO SUL, 1989), and later modified the program definition by Decrees nº 34.047 (RIO GRANDE DO SUL, 1991), and nº 35.003 (RIO GRANDE DO SUL, 1993)¹. From these decrees, the Rio Grande do Sul state government institutionalized the first Pro-Guaíba's definition (RIO GRANDE DO SUL, 1993):

Art. 1º - Institute the Program for Rational Development, Recuperation and Environment Management of the Guaíba Hydrographic Watershed Region - Pro-Guaíba, the objective of which is to create the necessary conditions to develop its natural resources, to enable the recovery of the quality of the environment in urban and agricultural areas, and to promote the auto-sustainable² environment management of industrial, agricultural, livestock and forest production in the extended area of the watershed.

Subsequently, on December 30, 1994, the Rio Grande do Sul state government passed the State Water Resources Policy following Law nº 10.350 (RIO GRANDE DO SUL, 1994)³. By this law, the state government defined the principles and objectives to balance economic and social development with environmental preservation, and created the Watershed Management Committees. The objective of these committees is to promote community engagement in water resource management by incorporating government institutions, water collectors, and users of water resources. As a result, the State of Rio Grande do Sul started to follow a worldwide environmental trend called "integrated water resource management" (DUDA, 2003; RAHAMAN, VARIS, KAJANDER, 2004; REGMI, 2003; RICHTER, MATHEWS, HARRISON, WIGINGTON, 2003; WALLACE, ACREMAN, SULLIVAN, 2003).

Furthermore, following the efforts of the United Nations Environment Program (UNEP) to institutionalize environmental issues into public policies in developing countries (BIERMANN, 2002; HANDL, 1998; NOBRE, AMAZONAS, 2002) in 1993, Pro-Guaíba's Executive Secretary replaced the "auto-sustainable" term with the "sustainable" term to define the target of the program. The "sustainable" term works in accordance with UNEP's concept of "sustainable development"⁴ (NORONHA, 1998; WORLD COMMISSION

¹ These decrees and laws are available at <http://www.al.rs.gov.br/legis/>.

² Even though the term "self-sustainability" is usually related to autopoiesis (VARELA, MATURANA, & URIBE, 1974), in this case the term is synonymous with sustainability.

³ This law was endorsed by Article 21, Item XIX, of the 1988 Brazilian Federal Constitution, which established parameters for the creation of the National Water Resources Management System, and by Article 171, of the Rio Grande do Sul Constitution, which established the Watershed State System.

⁴ Development that meets the needs of the present without compromising the ability of future generations to meet their own needs, in accordance with technology and social organization overseeing environmental resources, and in keeping with the ability of the biosphere to absorb the effects of human activity (BRUNDTLAND, 1987). Because the concept is already widely in use, this paper does not include an additional chapter to discuss it.

ON ENVIRONMENT AND DEVELOPMENT, 1987), which also strongly reflects eco-development and Agenda 21 concepts (SACHS, 1986; SACHS, LOPES, 1993). This notion is reaffirmed by Pro-Guaíba's report of module 1 that redefined the program "based on a systemic vision focused on the construction of an ecologically sustainable, economically viable and socially fair model" (RIO GRANDE DO SUL, 2001, p. 7).

In summary, since 1989, Pro-Guaíba's Executive Secretary has defined this program as: (a) an environmental sanitation program for the Guaíba Watershed (1989), (b) a commitment to auto-sustainable handling of the natural resources in accordance with social-economic development (1991), (c) an ecologically sustainable, economically viable and socially fair program (1993), and more recently (d) an ecologically sustainable and socially fair development program for the Guaíba Watershed Region (1998)⁵ (ASSIS, 2004; ASSIS, PEDROZO, 2003, 2005; NORONHA, 1998; RIO GRANDE DO SUL, 2001). Although these changes are justified by social and political transformations during the period of the program development, this instability has given rise to several criticisms about the scope and efficacy of Pro-Guaíba in enforcing both conceptual and pragmatic aspects as described previously.

Concerning the pragmatic aspect of the program, Pro-Guaíba's Executive Secretary emphasized the complexity of the program execution because of the required interdependence between eleven co-executor state institutions (RIO GRANDE DO SUL, 2001). Noronha (1998) reported that institutional strengthening and consolidation of an integrated legal system for the watershed region are core strategies to enable the program to overcome this barrier. However, program efforts to analyze and design a new institutional system for the watershed region were inconclusive (RIO GRANDE DO SUL, 2001). Consequently, new doubts about the efficacy of the Pro-Guaíba Program were raised, and there was recognition of the need for an alternative institutional analysis of the program.

Thus, the objective of this paper is to integrate neoinstitutional theory (DIMAGGIO, 1991; DIMAGGIO, POWELL, 1983; JEPPERSON, 1991; MEYER, ROWAN, 1977; POWELL, 1993) with Morin's complex tetralogical model (MORIN, 2001, 2002a) in order to analyze the role of the Pro-Guaíba Program in institutionalizing the concept of sustainability in a field of eleven co-executor state institutions. This paper does not intend to propose solutions for the conceptual and pragmatic aspects discussed before but rather to present an alternative analysis of the changing institutional dynamics.

The Tetralogical Perspective of Institutional Analysis

A tetralogical model in organizational analysis

Several authors have used the concepts of institutionalized organizations, isomorphism, and organizational and inter-organizational fields in organizational analysis (DIMAGGIO, 1991; DIMAGGIO, POWELL, 1983; JENNINGS, ZANDBERGEN, 1995; JEPPERSON, 1991; MEYER, ROWAN, 1977; SCOTT, MEYER, 1993; TOLBERT, ZUCKER, 1996 and others). However, the theoretical question about how institutions, or "the rules of the game in a society" (NORTH, 1996, p. 3), have been created and transformed still remains only partially answered (BENSON, 1977; HOLM, 1995; SEO, CREED, 2002). If the power and the interests of the agents play an essential role in institutional structure and change (DIMAGGIO; POWELL, 1983), how can we explain the fact that the agent's actions, intentions and rationality are also influenced by the same institutions that they work to change? Are institutions defined by agents' interests and ideas, or are these same agents' interests and ideas defined by institutions? (TAPIA; GOMES, 2008)⁶ Furthermore, how can institutional stabilization (MEYER; ROWAN,

⁵ This last definition excludes the economic dimension of sustainability.

⁶ *Tapia and Gomes (2008) point out the need for approaches that consider the formation of interests and ideas simultaneously by agents and institutions.*

1977) and total institutionalization (JEPPERSON, 1991; TOLBERT, ZUCKER, 1996) be understood when institutions continue to work recursively and simultaneously in the system as both cause and consequence of the conflicts and tensions that contribute to both institutionalization and deinstitutionalization? These questions suggest the need for institutional approaches that consider recursive and systemic aspects in processes of institutional change from a multiparadigmatic perspective (ASSIS, PEDROZO, 2005; MACHADO-DA-SILVA, FONSECA, CRUBELLATE, 2005).

Morin's complex tetralogical model (MORIN, 2001, 2002a) was chosen for the present study over other theoretical models, such as Benson (1977), Prigogine (1963), and Luhmann (2003) because of the ability of Morin's theory to integrate many disciplines and to construct bridges between them (DOBUZINSKIS, 2004). Thus, on the one hand the neoinstitutional theorists maintain that organizations develop inseparably from economic and social systems by mechanisms of institutional isomorphic adjustments; on the other hand, we introduce Morin's dialogic⁷ principle to affirm that organizations are dialogically connected by interactions with endocausal and exocausal tensions (MORIN, 2001, 2002a) that precede these adjustments. Morin's dialogic principle of complexity states that order, disorder and organization antagonize, compete, and complement simultaneously in the same phenomenon. Consequently, the analysis of organizational field interactions is fundamental to understanding the organizational phenomenon of structuring and changing.

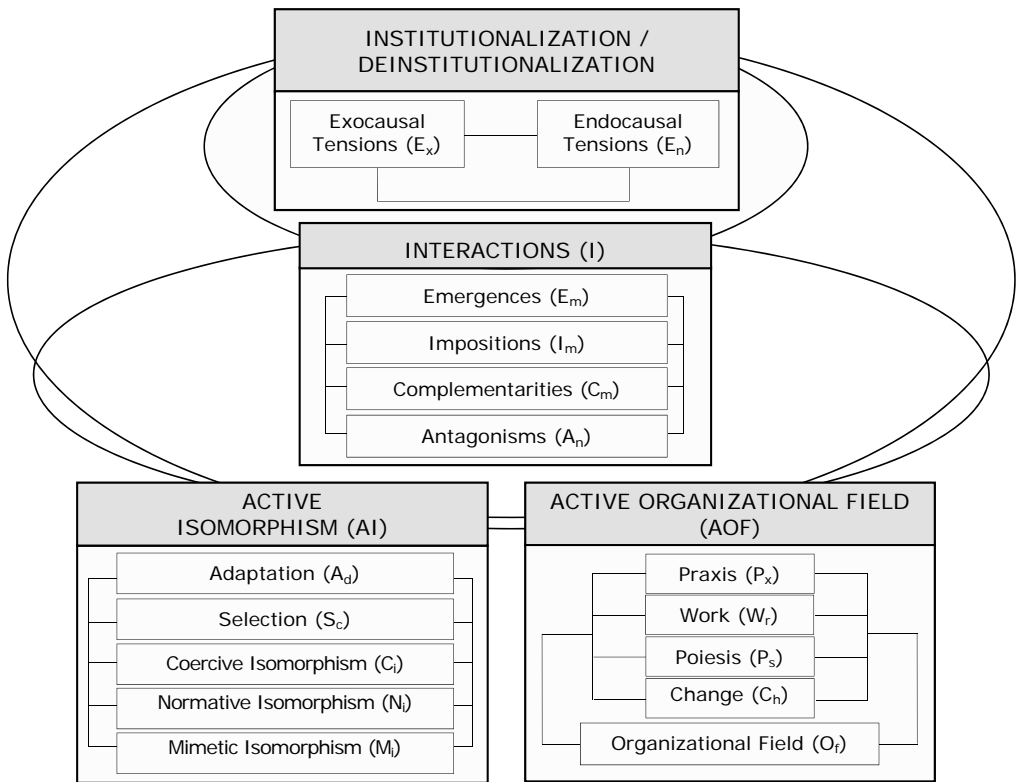
Interactions are reciprocal actions that are motivated by encounters that, in some conditions, become interconnections (associations, links, communications etc.) (MORIN, 2002a). Interactions are essential for the existence of order and organizational. However, disorders (agitation, turbulence, or change) are also sources of encounters that promote new organizational interactions. Therefore, to understand the dialogic of organizational change, it is necessary to frame order, disorder, and organization in the same "tetralogical circuit"⁸ (MORIN, 2002a, p. 104) where these elements coexist through simultaneous interactions of complementarities, competitions, and antagonisms. Morin's interactions and dialogic principles are applied in this study to describe the phenomena of structuring and restructuring of the organizational field through the *tetralogical model of institutional analysis*, described in Figure 1. By analyzing the interactions of the tetralogical circuit elements in the organizational field, it is possible to understand how these elements modify the organizational field behavior and nature, and create a complex organizational field that structures and restructures itself through dialogic processes of institutionalization and deinstitutionalization.

Interactions (I) - Interactions are the center of all institutionalization and deinstitutionalization processes. According to Morin (MORIN, 2002a), interactions are emergences, impositions, complementarities, and antagonisms that coexist in the whole system. *Emergences (E_m)* are qualities or properties of the system elements (parts) that are not new to the individual parts, but are new to the system.

⁷ Morin defines dialogic as "a complex unit between two logics, entities or substances, that are complementary, competitive, and antagonistic, and that feed each other, complement each other, but also counteract and combat each other" (MORIN, 2002b, p. 300-301). Morin's dialogic definition differs from Hegel's dialectic. In Hegel, contradictions are resolved through a solution that overcomes and suppresses them into a higher logical statement. In dialogic, antagonisms persist and are constituents of complex organizations through tetralogical loops of interactions.

⁸ From Ancient Greek τετρα (tetra, "four") + λογος (logos, "speech, oration, discourse, quote, story, study, ratio, word, calculation, science, reason"), the term means a reason or science of four parts which exists in a dialogic interrelation with each other simultaneously and recursively (MORIN, 2001, 2002).

Figure 1 - The Tetralogical Model of Institutional Analysis



Thus, new associations of existing parts within the system can create a new system quality or property. In addition, some properties remain in a potential state because there are no associations yet. *Impositions* (I_m) are mechanisms of control, limits, rules, and differentiations that inhibit qualities or properties that may jeopardize the system's stability. *Complementarities* (C_m) are interactions between parts of a system, and between those parts and the whole system that organize the system. *Antagonisms* (A_n) are mechanisms that produce and limit complementarities through a continuous process of creating and inhibiting antagonisms. Based on the premise that organizational fields are complex organizations connected dialogically by interactions, hence:

Hypothesis 1: The complex organizational field structuration is simultaneously a cause and effect of interactions of emergences, impositions, complementarities and antagonisms between the field institutions and the whole system.

Active organizational field (AOF) - Organizational fields (O_r) are "those organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products" (DIMAGGIO; POWELL, 1983, p. 148). Morin (2002) defines as *active* organizations those which create interactions *and* are created from interactions dialogically. This means that active organizations produce, organize, and reorganize themselves recursively by a logical circuit of praxis, work, production, and change – the praxical circuit (MORIN, 2002). *Praxis* (P_x) includes all actions that have an organizational characteristic. *Work* (W_r) includes all practical activities of production and change. *Production* or *poiesis* (P_s) is the generative aspect of interactions. *Change* (C_n) refers to all activities that result in new organizational forms.

Based on the second premise that complex organizational fields are active organizational fields, hence:

Hypothesis 2: The complex organizational field praxical circuit operates continuously to structure and restructure the field by institutionalizing and deinstitutionalizing interactions between the field institutions and the whole system.

Active isomorphism (AI) - DiMaggio and Powell (1983, p. 149) describe institutional isomorphism asserting "after a certain point in the structuration of an organizational field, the aggregate effect of individual change is to lessen the extent of diversity within the field". These authors affirm that institutional isomorphic changes occur through three mechanisms: (a) *coercive isomorphism (C_i)* that "results from both formal and informal pressures exerted on organizations by other organizations upon which they are dependent, and by cultural expectations in the society within which organizations function" (DIMAGGIO; POWELL, 1983, p. 150); (b) *mimetic isomorphism (M_i)* that occurs when organizations "tend to model themselves after similar organizations in their field that they perceive to be more legitimate or successful" (DIMAGGIO; POWELL, 1983, p. 152) or due to uncertainty; and (c) *normative isomorphism (N_i)* which happens when members of an occupation define the conditions and methods of their work, and establish a "cognitive base and legitimacy for their occupational autonomy" (DIMAGGIO; POWELL, 1983, p. 152). Our third premise is that these mechanisms of institutional change are organizational mechanisms, according to Morin's (2001) definition of adaptation and selection. *Adaptation (A_o)* is an organizational process of instituting interactions of complementarities and/or antagonisms with other organizations to resist competitions and confront aleatory events from the whole system. *Selection (S)* is an organizational process of self-selection by selecting the interactions that are more viable and feasible, and eliminating the other ones that are less viable or feasible. Therefore:

Hypothesis 3: Mechanisms of institutional isomorphic change are complex organizational field mechanisms of adaptation and selection of the necessary interactions to confront exocausal and endocausal tensions.

Institutionalization/deinstitutionalization - Our fourth premise in this study is that structuration and restructuring of the active organizational field (AOF) depends on Morin's (2001) idea of dynamic balance (or *morphostasis*⁹) between exocauses and endocauses. *Exocauses (E_x)* are deterministic or aleatory tensions from the macro environment or whole system. *Endocauses (E_r)* are microenvironmental cause-and-effect aspects from organizational interactions. This means that there are infinite cause-and-effect combinations between both exocausal and endocausal tensions, including interactions within the field, that can promote institutional change. Consequently, the elements of the tetralogical circuit can result in both institutionalization and/or deinstitutionalization dialogically, thus resulting in a complex and dynamic phenomenon of organizational change. Hence:

Hypothesis 4: Complex institutional isomorphism and stabilization depend on the dynamic balance of exocausal and endocausal tensions, and interactions related to field institutions, organizational fields, and the whole system.

The tetralogical model of institutional analysis

The tetralogical model of institutional analysis introduces at least two notions: (a) the notion of *active isomorphism* and (b) the notion of an *active organizational field*. The notion of *active isomorphism* integrates the idea of institutionalized organizations and isomorphic institutional change (DIMAGGIO, POWELL, 1983; MEYER, ROWAN, 1977) with Morin's (MORIN, 2001) definitions of adaptation and selection. The neoinstitutional theory definition of isomorphism focuses on the organizational tendency to incorporate rationalized concepts from the social system as a way to obtain legitimacy, resources, stability, and enhanced survival prospects. The complex definition of active isomorphism focuses on how interactions between field organizations, active organizational field, and the whole system establish complementarities

⁹ Processes in complex system-environment exchanges that tend to serve or maintain a system's given form, organization, or state (HEYLIGHEN, 2009).

and antagonisms with endocausal and exocausal events in order to restructure, stabilize and increase the permanency prospects of field organizations, active organizational field, and the whole system. Organizations adapt themselves to the active organizational field environment by selecting interactions (emergences, impositions, complementarities and antagonisms) with institutions that are the most reliable and/or viable in order to ensure their permanency in the active organizational field, and to ensure the survival of the active organizational field itself. At the same time, the active organizational field must also select organizations through its interactions, as a way to adapt itself to the macro-environment and guarantee its own permanency. Therefore, active isomorphism is defined as an organizational survival mechanism of selecting interactions (of complementarities, competitions, and antagonisms) between organizations in the field in order to adapt interactions from both organizational field and the greatest system in which the active organizational field is embedded in an interdependent association. The idea of active isomorphism does not contradict the traditional definition of isomorphism; rather, this idea adds the dialogism and recursiveness of the interactions to the institutional isomorphic change analysis.

The idea of an active organizational field confers to the traditional organizational field concept more than just the characteristics of "those organizations that, in the aggregate, constitute a recognized area of institutional life" (DIMAGGIO, 1991, p.64). An active organizational field is defined as a complex organization comprised of other organizations empowered with both generative and regenerative internal qualities capable of structuring, restructuring and adapting themselves to the whole system dialogically, recursively and continuously by interactions. Therefore, there is a symbiosis between the *poiesis* of the active organizations that constitute the field and the *poiesis* of the active organizational field to adapt and select itself to the whole system as an active organizational entity. The activities of the organizations that comprise the organizational field operate for the purpose of self-production and for the production of the active organizational field simultaneously, instituting and changing their specific organizational processes of self-production into organizational processes of structuration and restructuring of the organizational field. The description of this symbiosis is corroborated by the classic definitions of coercive, mimetic and normative isomorphism (DIMAGGIO; POWELL, 1983) and by the notion, previously presented, of active isomorphism.

According to the tetralogical model approach, the subjacent processes of institutionalization and deinstitutionalization occur in nonlinear, interconnected, retroactive, recursive, and dialogic manners, thus configuring a complex characteristic of auto-endo-exo-causality that transcends the traditional models of neoinstitutional analysis. Therefore, based on the previous premises:

Hypothesis 5: Tensions, antagonisms, and deinstitutionalization are not institutional paradoxes, but rather essential elements to promote interactions that are necessary for institutional isomorphism, stabilization, and permanency of the organizational field, field organizations and macro environment.

Research Design

This study can be defined as an exploratory and qualitative embedded case study (YIN, 2003a, 2003b). The Pro-Guaíba Program (or Pro-Guaíba) was chosen as the unit of analysis because of its characteristic of integrating a set of eleven co-executor institutions in an organizational field in order to promote a common sustainable development strategy for the Guaíba watershed. These institutions are: (a) CORSAN (Sanitation Company of Rio Grande do Sul); (b) DEFAP (Department of Forestry and Protected Areas); (c) DMAE (Water and Sewage Department); (d) DMLU (Municipal Urban Cleaning Department); (e) DRH (Water Resources Department); (f) EMATER-RS (State Agency for Technical Assistance and Rural Extension); (g) FDRH (Human Resources Development Foundation); (h) FEPAM (Environmental Protection Agency); (i) FZB (Zoo-Botanic Foundation); (j) METROPLAN (Metropolitan Planning Agency); and (k) SE (Secretary of Education).

Methodologically, Pro-Guaíba was divided into sub-units of analysis according to the six subprograms that are overseen by the co-executor institutions in Module 1 of the Pro-Guaíba Program: (a) Subprogram 1 - Structuring and Strengthening of the Legal and Institutional Foundations of the Program; (b) Subprogram 2 - Diagnosis, Management Strategies, and Monitoring System; (c) Subprogram 3 - Prevention and Control of Industrial and Domestic Pollution; (d) Subprogram 4 - Renewable Natural Resources Management; (e) Subprogram 5 - Protected Areas - Parks and Reservations; and (f) Subprogram 6 - Environmental Education (NORONHA, 1998).

The data-gathering process was conducted through both documentary research and in-depth interviews, the objective of which was to find evidence that would be categorized according to the neoinstitutional and complexity theoretical constructs. The documentary research included: (a) five official decrees (Decree n° 33.360/89, Decree n° 34.047/91, Decree n° 35.003/93, Decree n° 35.004/9, and Decree n° 36.127/95); (b) two laws (Law n° 9.893/93 and Law N° 11.362/99)¹⁰; (c) two reports of the program Module 1 (2001 Progress Report, and 2002 Final Report); and (d) two contracts between the Inter-American Development Bank (IDB) and the Executive Secretary of the Pro-Guaíba Program.

The in-depth interviews were carried out through a sample of people chosen because of their knowledge of the program's development: (a) six subprogram coordinators who have worked for the program since 1989; (b) two ex-secretaries of the State Secretary of Coordination and Planning who worked for the organization in distinct political periods (before and after the program implementation); (c) one administrative consultant who has worked for the program since 1989; and (d) one technical consultant of the Technical Advisory Team of the Guaíba Watershed Environmental Management and Control Plan, who has worked for the program since 1989.

To assure the reliability of this procedure, traditional techniques of content analysis were applied (BARDIN, 2008; MORAES, 1999; SAMPIERI, SAMPIERI, COLLADO, LUCIO, 2006). First, the prior categories of constructs and their meanings were defined and codified according to neoinstitutional and complexity theories to guarantee the construct validity (YIN, 2003b). Next, the documents and reports of Pro-Guaíba were analyzed, as well as the records of the in-depth interviews. The objective of this was to select samples of information, which were meaningful and relevant for the purposes of analysis (subtracting nonrepresentative information and naive reports). The samples of information were reviewed outside of the original context and paraphrased based on keywords in order to set the units of information¹¹. The keywords represent the evaluative components of statements, i.e. attitude objects (people, groups, ideas, things, events), the evaluative terms (terms that qualify the attitude objects), and the connectors (that verbally link the statement of attitude objects and terms of qualification) (MOREIRA, SIMÕES, PORTO, 2005). Then, the units of information were categorized according to the theoretical constructs from neoinstitutional and complexity theories. After that, the units of information were paraphrased based on the keywords of the category and recodified. Finally, the categories of constructs and their respective units of information were grouped according to their historical contexts within the program development to set the categories of context.

This procedure led to a reduction from 121 down to fourteen units of information with minimal loss of relevant information. Units of information cannot be confused with ethnographic data, despite its similarity, because they do not consist of raw citations, but rather results of an agglutination process (analogous to the morphological process) of different samples of information based on keywords. Furthermore, this procedure allowed us to triangulate data from documentary research and interviews with the categories of constructs from the neoinstitutional and complexity theories in a deductive method (POPPER, 1992), despite the use of predefined theoretical categories.

¹⁰ These decrees and laws are available at <http://www.al.rs.gov.br/legis/>.

¹¹ The term "unit of information" is used here instead of the term "unity of analysis" that is used in content analysis to define the samples of information to avoid confusion with the same term that is also used to define the object of analysis in case studies.

The evidence analysis was done by examining the relationship between units of information and theoretical constructs according to their category of context. The internal validity of this study was confirmed by using the tetralogical model of institutional analysis, described previously, as a mental model to visualize and analyze the role of the Pro-Guaíba Program in structuring the sustainable organizational field. Meanwhile, the study's external validity was confirmed by integrating the neoinstitutional and complexity theoretical approaches into a common analysis of the Pro-Guaíba Program.

Results And Discussion

The objective of this section is to present the analysis of Pro-Guaíba's role in institutionalizing a sustainable organizational field. To do this, the following sections are organized according to different historical contexts of the program's development, respectively: (a) the coercive isomorphism failure, which relates the historical context of those institutions before the creation of the program; (b) the emergence of the Pro-Guaíba Program, which analyzes the active isomorphism process of defining the program; (c) the sustainable organizational field structuration, which describes the role of the program in constituting a common praxical circuit for the field; and (d) the Pro-Guaíba permanency problem, which analyzes the role and meaning of the program in institutionalizing the concept of sustainability.

The coercive isomorphism failure

Exhibit 1 contains information related to Pro-Guaíba's historical context before the program's creation. The evidence analysis of this scenario suggested the existence of interactions (I) between both exocausal (E_x) and endocausal (E_n) tensions in the watershed region, although these interactions did not structure an organizational field (O_f). The activities of the praxical circuit (P_x, W_r, P_s, C_h) and the coercive isomorphism (C_i) to structure the organizational field failed due to the absence of mechanisms to promote interactions between the institutional agents.

Exhibit 1 - The Coercive Isomorphism Failure

#	Categories of construct	Units of information
1	$E_m, E_n, C_m, P_x, W_r, P_s, C_h, C_i$	Before the program was created, a set of studies and projects had been developed to diagnose existing environmental problems and to help watershed institutions and the community to work together in the development of a sustainable strategy for Guaíba's water resources. These efforts culminated in the creation of the Water Resources Council in an attempt to establish an institutional system of water management, in 1981.

In 1979 the federal government was working to introduce the Executive Committee for Integrated Studies of the Guaíba Watershed (CEEIG) the objective of which was to integrate federal, state, and municipal institutions in order to organize the existing knowledge about the Guaíba Watershed, and to propose a new classification for its water resources (SOARES NETO, FREITAS, AGRA, 2002; LANNA, 2007). CEEIG was coordinated by the Special Committee for Integrated Watershed Studies (CEEIBH) under the supervision of the National Department of Water and Electric Energy (DNAEE). One of the most notable results of this activity was the proposal for a monitoring network involving the State Department of Ports, Rivers and Canals (DEPREC)¹², the Municipal Department of Water and Sewage (DMAE), and the Water

¹² Now defunct.

Supply Company of Rio Grande do Sul (CORSAN), amongst others. Following these initiatives, in 1981, Decree n° 30.132/81 was passed to organize the State Water Resource System (SERH) (under the State Secretary of Planning - SCP), whose principal agency was the State Water Resources Council (CONRHIRGS). However, despite all these attempts to integrate, these different institutions continued to work in a disconnected manner (LANNA, 2007).

Neoinstitutional theory usually argues that institutional change (C_i) results from both formal and informal coercive isomorphic pressures (political influence, legitimacy, or government mandate). These pressures are exerted on organizations by other organizations and by cultural expectations in society (DIMAGGIO; POWELL, 1983). However, this definition of isomorphism does not provide an explanation for the failure of these mechanisms to promote the desired institutional change (C_n).

In fact, the federal government acted as an exocausal tension (E_x) to promote interactions of complementarities (C_m) between agents in the field. These complementarities, in turn, worked (W_i) to produce (P_s) a body of knowledge, a new classification of the water resources, and a monitoring system for the watershed (P_x). The network monitoring system can be considered an emergence (E_m) related to endocausal tensions (E_n) because although the studies about the watershed were not new for the individual institutions, the body of knowledge as a whole as well as the water resources classification were innovations for them. However, despite the fact that these elements were essential to structuring the institutions in a common organizational field (O_i), the evidence analysis showed that the institutions remained disconnected. The reason for this failure was linked to the absence of a mechanism to promote interactions continuously amongst these institutions via a common praxical circuit that would restructure the set of institutions as an active organizational field (AOF).

The emergence of the Pro-Guaíba Program

Exhibit 2 contains information related to the formation of Pro-Guaíba. An analysis of this information reveals the existence of program activities to organize the field and its structure (O_f) through interactions of complementarities (C_m), antagonisms (A_n), emergences (E_m), and impositions (I_m). The program selected (S_c) an exocausal tension (E_x) – IDB – and started the activities of the praxical circuit (P_x, W_r, P_x, C_n) in order to adapt (A_d) the set of institutions and to increase their probability of being selected by this exocausal tension. The exocausal tension influenced the program definition coercively (C_i) and normatively (N_i), which in turn influenced the co-executor institutions' selection of and adaptation to the exocausal tension. The efficacy of these coercive and normative mechanisms was associated with obtaining financial resources, rather than legitimacy. However, Pro-Guaíba's praxical circuit (P_x, W_r, P_x, C_n) for structuring the organizational field was not able to fully eliminate the antagonisms (A_n) related to the program's objectives.

Exhibit 2 - The Emergence of the Pro-Guaíba Program

#	Categories of construct	Units of information
1	<i>Em, Im, En, Ex, Sc, Ad, Ci, Ni, Cm</i>	The Pro-Guaíba Program was instituted by Decree n° 33360/89, and modified by Decrees n° 34047/91 and n° 35003/93 as a result of contractual adjustments between the state of Rio Grande do Sul (RS) and the Inter-American Development Bank.
2	<i>Em, En Ni, Ps, Px</i>	The program proposal is to create a new institutional system to promote an integrated management strategy for the Guaíba Watershed Region by engaging watershed institutions and the community.

3	<i>En, Ex, Sc, Ad, Cm</i>	By defending the integrative and sustainable management concepts, the program obtained resources from the Inter-American Development Bank, engagement of the diverse watershed institutions, and community participation, which were essential elements to promote and develop the program structure.
4	<i>En, Wr, An</i>	At the beginning of the program, there were many co-executors with low capacity to work in an integrated manner. In addition, the diversity of project activities and institutional arrangements were contrary forces hindering the program's development, which led to isolated actions with low inter-connectivity.

Pro-Guaíba was designed by the state of Rio Grande do Sul with technical assistance from the Inter-American Development Bank (IDB). The IDB is the largest source of multilateral foreign assistance to the nations of Latin America, and provides assistance to the borrowing member countries to develop and implement guidelines on integrated watershed management. The Pro-Guaíba concepts of reference, such as institutional strengthening and integrated management strategy, as well as the proposals to engage community participation, directly reflect the IDB's strategy for integrated water resources management – which in turn follows the accepted principles of the Dublin Declaration and Agenda 21 (IDB, 1998).

However, four years and three decrees were required to shift the program from a sectorial to a more integrated structure. In 1989, Decree nº 33360/89 defined the first institutional structure of Pro-Guaíba. This structure was composed of five bodies: The Board of Directors (representing government institutions), the Consultative Committee (representing civil society), the Executive Secretary (responsible for funding contracts), the Secretary of Coordination of Planning and Environmental Control, and the Secretary of Coordination of Emergence Response (both responsible for the implementation of the program's actions). This structure was top-down designed with the Board of Directors (top) controlling the distribution of all resources to implement the program. In 1991, through Decree nº 34047/91, the program activities were redefined in six subprograms or components. As well as this, the Secretary of Coordination of Planning and Environmental Control, and the Secretary of Coordination of Emergence Response were merged into a new body named the Secretary of Coordination of Subprograms. The Secretary of Coordination of Subprograms was composed of eleven co-executor institutions¹³ whose objective was to implement the subprograms. Finally, in 1993, Decree nº 35003/93 decentralized the program resources distribution by changing the Board of Directors into the Deliberative Committee that currently is composed not only of Government institutions, but also of representatives of the community.

The formation of the Pro-Guaíba structure and objectives was associated with a dialogic process of selecting and adapting interactions from both exocausal (E_x) tensions (IDB's strategy and objectives), and endocausal (E_n) tensions (institutions' praxis and objectives). Therefore in addition to the conventional neoinstitutional perspective in which organizations simply respond to pressures from other organizations on whom they depend, this study identified a dialogic process of "negotiation" between Pro-Guaíba's structure definition and the co-executor institutions' objectives due to the need for financial resources. Through this process, co-executor institutions defined Pro-Guaíba's structure and objectives, and Pro-Guaíba organized these institutions recursively into an organizational field.

Despite the risk of confusing institutionalization with resource dependency from the macrolevel perspective (ZUCKER, 1977), this study associated resources depen-

¹³ These eleven co-executors represent the organizational field of this study, and were also described in p. 9.

dency with organizational adaptation (A_d) and selection (S_c) at both macro and micro levels. At the macrolevel, Pro-Guaíba selected (S_c) the IDB's exocausal tension (E_x) and then adapted (A_d) the program's structure and objectives to complement (C_m) this tension. At the microlevel, co-executor agents had to select (S_c) and adapt (A_d) the endocausal (E_n) emergence (E_m) of Pro-Guaíba's structure and objectives into their organizational practices.

The sustainable organizational field structuration

Exhibit 3 - The Sustainable Organizational Field Structuration

#	Categories of construct	Units of information
1	<i>Ex, Em, Im, Cm, An, Sc, Ci</i>	Law n° 10.350/94 instituted the State Water Resources System (part of the National Water Resources System) that adopted the hydrographic watershed planning and management unit, and included the River Watersheds Committee to elaborate the water resources planning with technical subsidies from the Hydrographic Watersheds Agency and public consultation.
2	<i>Ex, Cm, Em, Im, Ad, Sc, CI, CN, Px, Wr, Ps, Ch, OF</i>	The program followed the criteria of Law n° 10.350/94 to engage the public participation systems (Participatory Budgeting, Regional Development Council, and Watershed Committees ¹⁴) and traditional sectors (environmental, rural, religious and cultural sectors) in the integrated watershed management strategy.
3	<i>En, An</i>	The diversified criteria adopted by public institutions existing in the watershed region increased the institutional complexity that the program's development had to face.
4	<i>Ex, En, Em, Px, Wr, Ps, Ch, OF</i>	The program used the watershed committees' structure to execute the public consultation and to expand to entire watershed region, including communities located in the interior of the stat, and to engage entities such as syndicates, environmental associations, universities and business organizations.

Exhibit 3 contains information related to Pro-Guaíba's active isomorphism. The evidence analysis of this information suggests that Pro-Guaíba had to select (S_c) and adapt (A_d) a new exocausal tension – the Brazilian National Water Agency (ANA) – to the activities of its praxical circuit (P_x, W_r, P_s , and C_n) in order to integrate the co-executor institutions into an active organizational field (O_f) focused on the integrated management of Guaíba's natural resources. The praxical circuit (AOF) organized co-executor institutions and Pro-Guaíba actively (and, therefore, recursively) by adapting (A_d) and selecting (S_c) interactions of emergences (E_m), impositions (I_m), complementarities (C_m), and antagonisms (A_n) related to both exocausal (E_x) and endocausal (E_n) tensions.

In 1994, one year after Decree n° 35003/93 redefined Pro-Guaíba's structure and objectives, Law n° 10350/94 instituted the State Water Resources System (SERH) in observance of the demands of the new Brazilian Constitution (BRAZIL, 1994)¹⁵.

¹⁴ Those systems cited were part of a number of innovative reform programs that allow citizens to identify, discuss, and prioritize public spending projects.

¹⁵ According to Article 21 of the Brazilian Constitution, the Union has the power to establish the national system for the management of water resources and define criteria for the concession of the right to their use (BRAZIL, 1994).

SERH is under the National Water Resources System (SNRH) that, in 1997, defined the legal and institutional instruments to manage issues related to water resources (Law nº 9433/97). These instruments are: (a) Watershed Resources Plan, elaborated by watershed regions and the state of Rio Grande do Sul, (b) the classification of the water resources by category of uses, (c) concessions for water resources use, and (d) charges for water resources use. At the same time, the proposed Law nº 9984/00¹⁶ – the objective of which was to create the Watershed National Agency (ANA) to implement these instruments (MACHADO, 2003) – was being discussed in the National Congress.

These three laws had a double institutional effect on the performance of Pro-Guaíba. On one hand, SERH and SNRH reinforced Pro-Guaíba objectives and legitimacy to develop a strategy for integrated watershed resources management, which corresponds to IDB's strategy for these resources. On the other hand, ANA started to compete with the structure and objectives of Pro-Guaíba.

The evidence analysis of this scenario suggests that laws nº 10350/94 and nº 9433/97 worked simultaneously as interactions of: (a) imposition (I_m), or the coercive aspect of law enforcement; (b) complementarity (C_m), or the law's objective of promoting an integrated management system for the watershed resources; (c) antagonism (A_n), related to the supposed competition between Pro-Guaíba's Executive Secretary and ANA structures; and (d) emergence (E_m), a result of the new legal and institutional instruments to promote the integrated resource management of the watershed.

To deal with this complex set of interactions (I), Pro-Guaíba selected (S_c) new legal and institutional instruments and started to work actively to adapt (A_d) its strategy to this exocausal (E_x) emergence (E_m) and consequently to institutionalize these legal and institutional instruments into the organizational field structure (AOF). This active isomorphic strategy promoted a symbiosis between Pro-Guaíba and ANA's interactions in order to structure the organizational field of co-executor institutions.

An illustration of this symbiosis between Pro-Guaíba and ANA was observed during the formation of the Guaíba Lake Committee. This committee was instituted in 2007, during a meeting organized by Pro-Guaíba with financial resources obtained from IDB (SOARES NETO *et al.*, 2002). Furthermore, by working to promote ANA's legal and institutional instruments, Pro-Guaíba expanded its boundaries of influence in the watershed region.

The Pro-Guaíba Program's permanency problem

Exhibit 4 contains information from the final period of Module 1 of Pro-Guaíba that is related to the conceptual and pragmatic problems of institutionalizing the concept of sustainability. Analysis of this information suggests that the institutionalization of the sustainable organizational field (AOF) depends on the permanency of the praxical circuit structure created by Pro-Guaíba as an institutionalized organization.

Exhibit 4 - The Pro-Guaíba Program's Permanency Problem

#	Categories of construct	Units of information
1	<i>Em, Cm, Po, Pr, Wr, Ch, Of</i>	The creation of the Pro-Guaíba Integrated Information System (SIGPROGB) including different co-executors promoted an integrated process of planning and monitoring actions for the benefit of the watershed
2	<i>Pr, Ch, Of, NI, En, Em, Cm</i>	The program activities have the objective of promoting institutional strengthening and consolidation of an integrated legal system for the watershed through an integrated planning to guide the work of the institutions that work there.

¹⁶ This law was passed on July 17, 2000.

4	<i>En, Em, Cm, Ni, Pr, Wr, Po, Ch, Of</i>	During the institutional system's development, more than 80 agreements were established between watershed institutions and state agencies to execute the program objectives, including legal, environmental, financial, and evaluation assets.
5	<i>En, Em, Cm, Pr, Pr, Wr, Ch, Of, Ad, Sc</i>	The diversity of participants was conducive to the realization of meetings with all co-executors to discuss the work in progress through the Co-Executors' Forum, perceived as progress in the structure of the institutional system.
6	<i>En, Em, Cm, Pr, Wr, Po, Ch, Of, Ad, Sc</i>	The institutional system promoted a "horizontal cut" in the state structure that made institutions with different rules begin to work together, and the program activities started to become part of these institutions' routines, resulting in more efficiency.
7	<i>Pr, Wr, Po, Ch, Of, Ad, Sc, Ni, En</i>	The program components and activities (SIGPROGB implementation, research, environmental education, social communication, training, seminars, publications, activities to motivate co-executors and promote community integration, etc.) helped to create a common consciousness about the sustainable management of the watershed region.

The various outcomes described in exhibit 4 illustrate the performance of the program in implementing its activities. However, these activities are not the principal outcomes of the program. Rather, they are part of Pro-Guaíba's strategy to engage institutions in an integrated system of watershed management. Thus, the SIGPROGB, the agreements (legal, environmental, financial, and evaluation assets), the forum of co-executors, and several other reported activities of the program cannot be used individually as parameters to evaluate Pro-Guaíba's performance. Rather, the "horizontal cut" resulting from integrating Pro-Guaíba's activities should be considered the principal outcome of Pro-Guaíba. Pro-Guaíba promoted an intersectional structure integrating different institutions to form a common organizational field, the necessary condition to develop an integrated strategy for watershed resource management.

On one hand, a weakness of Pro-Guaíba's strategy is the fact that this structure depends on financial resources and if these resources are no longer available it can disappear. On the other hand, Pro-Guaíba's strong point is the structuration and organizational learning about integrated water resources management. Currently, Pro-Guaíba is being considered to become the first of three Regional Agencies for Watershed Management by the government of Rio Grande do Sul, following the state legislation (RIO GRANDE DO SUL, 2007).

This study suggests that Pro-Guaíba's "horizontal cut" can be understood as the praxical circuit structure ($P_x, W_r, P_s,$ and C_n) to promote the activity of the sustainable organizational field (AOF). This information provides a different explanation of the neoinstitutional statement that the organizational field structuration is a consequence of mechanisms of isomorphic institutional change. Using the tetralogical view of institutional analysis, the praxical circuit was observed to work dialogically as both cause and effect of those mechanisms through processes of adaptation (A_d) and selection (S_c) of interactions (I) related to exocausal (E_n) and endocausal (E_n) tensions that, in turn, promoted the organizational field (O_r).

Conclusions

This study of Pro-Guaíba, based on the hypothesis of the tetralogical model of institutional analysis, has offered a rich set of findings regarding the role of this program

in institutionalizing the concept of sustainability. The concepts of active organization field and active isomorphism better explain the nature of Pro-Guaíba's institutional change because it replaces both the concepts of dialectic as well as paradoxes with the concept of dialogic. This is to say that contradictions, complementarities, and competitions are not only a constant source of institutional change, but they are also the reason for institutional stabilization as well as the impossibility of total institutionalization. On one hand, contradictions were a source of exocausal and endocausal tensions that stimulated new interactions to change. On the other hand, due to the need for resources, it was observed that contradictions were accepted by agents and turned into rational agreement between agents, similar to Simon's (1997) assumption of bounded rationality, where agents aimed for satisfactory and not optimal solutions.

Furthermore, exocausal tensions determined the "principle of rationality"¹⁷ that governed the co-executor institutions' decisions. Despite the fact that legitimacy, or the "value pattern of the society" (STILLMAN, 1974)¹⁸, has been considered an essential factor in neoinstitutional analysis (1997), this study has shown that dependence on resources was the principal explanation for Pro-Guaíba's formation, although legitimacy was a formal requirement to acquire those resources. Resource dependence has been identified as a cause for institutional change because it constrains organizations under similar pressures that pattern organizational behavior (DIMAGGIO, POWELL, 1983; PFEFFER, 2003). This resource "path-dependency" has also been identified by Rocha (2004) as a precondition for institutional change in public policies in Brazil. This observation also corroborates Machado-da-Silva and Fonseca's (1993, 1996) claim that the process of organizational structuration is not only a result of institutional exigences, but also from interpretative and circumstantial schemes. In the case of the Pro-Guaíba Program, this "resource-path-dependency" was directly related to exocausal tensions that dialogically influenced the endocausal interpretative and circumstantial schemes that led the program to institutionalize the IDB's "strategy for integrated water resource management" (IDB, 1998) as the concept of sustainability.

Concerning the pragmatic aspect, this study has demonstrated Pro-Guaíba's role in promoting the praxical circuit to integrate different institutions into a common intersectional and interorganizational structure - the "horizontal cut." The activities of the praxical circuit operated actively to integrate the co-executor institutions into the same strategy for the sustainable management of water resources.

However, the efficacy of the program will be verified only by the permanency of its conceptual structure into the praxis of those organizations. Thus, the success of the program still depends on the adoption of Pro-Guaíba's conceptual and structural elements into the Regional Agency for Watershed Management of the Guaíba Region, which can provide legitimacy and resources for its permanency.

In addition, the adoption of the Pro-Guaíba Program as the first regional agency of watershed resources demonstrates: (a) the institutional stabilization of the conceptual aspect of the Pro-Guaíba Program's concept of sustainability, and (b) the institutional stabilization of the pragmatic aspect of the Pro-Guaíba Program, i.e. of the praxical circuit structure developed by the program to implement this conceptual aspect.

Summarizing, this study has demonstrated that the existence of a praxical circuit structure, which can actively define or influence interactions and isomorphism processes of field structuration, is fundamental to manage the process of institutional change. In addition, the adoption of the Pro-Guaíba structure formally in the form of a government agency can be considered empirical evidence of the stabilization of Pro-Guaíba as an institutionalized organization.

¹⁷ Newell's principle of rationality: "If an agent has knowledge that one of its actions will lead to one of its goals, then the agent will select that action" (NEWELL, 1981, p. 8)

¹⁸ Stillman's (1974, p. 39) tentative definition of legitimacy is "a government is legitimate if and only if the results of governmental output are compatible with the value pattern of the society".

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