

Governance Structures in Clusters: a Case Study on Software Cluster in the State of São Paulo

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Abstract—Cluster Governance concerns the way of coordination, control, intervention and involvement of actors from local arrangement. Owing to substantial increase of the importance of public policy in clusters, it's important to understand the dynamics of stakeholder participation in these arrangements. Thus, this study aimed to analyze the governance structure at the Ribeirão Preto's Software Industry. In order to achieve that, were conducted in-depth interviews with arrangement's actors to identify the different influences on the coordination of the arrangement. The interviews results showed: a) governance influenced positively the cooperation and business development, b) the development of the cluster depends, in the case analyzed, in much of the private governance, c) powerful actors and holders of coordination mechanisms, determine the relationships, resources and rules, proposing new institutional orders. In the end, this study contributes to the understanding of governance relations between the actors and their consequences for the arrangement.

I. INTRODUCTION

Internal relationships in the cluster should be considered key elements in defining how the different regions interact with external agents. Becomes necessary to examine how local economies are included in the global economy, including the interests of external actors and how these interests affect the governance structure of these regions (favorably or not) and, moreover, how these factors reflect on the development of the country as a whole. Such considerations modify the possibility of promoting local development from the "model of industrial cluster." Policies which focus only on local relationships can threaten the development process of a nation, since the policies and practices of the distribution of power between the international and national agencies have a central role in the articulation process, for which the basis of the links between internal and external actors should be observed.

It is from this perspective that this paper discusses the structure of governance in the software industry in the city of Ribeirão Preto, their conditioning, fundamentals and analytical evidence from a case study.

Is understood governance in clusters as the ability to control or coordination that certain agents (companies, institutions, or even a coordinator agent) have on the productive, commercial, technological, and other interrelationships, decisively influencing its development.

To achieve the proposed objective, we carried out a field survey in the form of in-depth interviews with key actors in the Ribeirão Preto software industry. Therefore, this study incorporates the literature of specialized productive agglomerations and governance approach. Next, the results of

field research conducted in Ribeirão Preto, which focus mainly on how the software industry in this region falls within the cluster concept and how its governance structure influences the performance of clustering are presented. Finally, the conclusions are evident from the study.

II. THEORICAL FRAMEWORK

The changes in the global economy with the rapid advance of globalization and international competitiveness of enterprises require greater agility. Therefore, in general, organizations are developing in search of competitive strategies to meet the increasing social and human needs.

Several authors have been researching regional development through work organized in cooperation networks. References [22] and [23] published his studies on industrial districts, [24] have studied industrial clusters, [5] and [6] have published their studies on networks topdown work. In summary, these authors described the competitive advantages that a productive cluster brings to a sector installed in the same geographic region as logistical advantages, suppliers, skilled labor and tacit knowledge regionalized businesses.

Reference [25] emphasizes that both operational effectiveness and strategy are important for the performance, it is the primary goal of all businesses. Also believes that the presence of related and supporting industries institutions in the same geographic region is a factor of competitive advantage. Through the flow of information and technical exchange accelerates innovation and increases the chances of companies to develop new skills and constitutes a source of new entrants that will bring a new approach to industrial competitiveness.

The joint and collaborative work is one of the strategies of industrial clusters, aimed at strengthening productive sectors of a microregion. The idea of the cluster is precisely the opposite of improved competitive market organizations for local spatial aspect and the power relations highlighted by the (public-private) hybrid form of governance [4]. At whatever level of development, an important factor for the success of a cluster is the way in which it gives its governance. The factors that determine the form of governance in clusters are supported on various types of analytical approaches. Much of these approaches specifically addresses governance in production systems organized in networks or supply chains led by leading companies, which are often external to the local system. Among the authors of this line of analysis include: [12], [21], [31], [32] and [33].

In contrast to these approaches, [18] analyzes the strategic exercised by agents on local production systems by controlling the flow of information and knowledge about demand characteristics, type of product and market trends command. Finally, [29] demonstrates the importance of the social construction of localized political and cultural assets as a basis for collective action.

Based on original contributions from [38], [30] address the issue of governance by analyzing the hierarchies which are formed within the chains of production and distribution of goods. Use the concept of production system, which define how the coordination structure that is formed from the interactions that occur along the supply chain, where there are vertical and horizontal relationships between firms, these relationships can be governed by purely market mechanisms or result of interactive processes between agents, even with the formation of strong hierarchies.

From this concept, they seek to analyze the structure of this governance in these relations, ie, the degree of hierarchy, leadership and command (or, alternatively, collaboration and cooperation) between the participants of the system companies. The governance structure is shaped by relations of power (or cooperation) along the chain of production and distribution of goods.

Therefore, the authors seek to establish whether, and to what extent, the relations within the production system resulting hierarchies imposed by agents participating in the process, or any coordinating structure is prevalent in the market and hierarchies are replaced by frequent interactions among stakeholders, resulting in a greater degree of collaboration and cooperation in relations between companies.

Reference [30] incorporate the analysis of the territorial dimension of productive activity and the formation of clusters of firms. Concentrated in the same sector or industry segment, which in turn attract suppliers and service providers, enterprises presence makes them develop intense interactions between local companies. These interactions can be controlled by a great leader or more of a large company coordinator or coordinators may not be large firms. The high frequency of interactions arises from the division of labor between specialized producers and suppliers, resulting in competitive gains for firms participating in the production system.

In this direction, [16] show that there are forms of local, private and public governance, which can play an important role to improve the competitiveness of clusters producers. The main argument of the authors is that the benefits of agglomeration of firms are not restricted to external economies provided by the cluster, but can also include external economies generated by deliberate actions of local actors in fostering productive activities and encouraging the rapid spread of knowledge. These actions can be coordinated by the public sector, through public policies or private actors, such as trade associations or business leader.

In the case of local governance exercised by the public sector stand out actions aimed at creating and maintaining organizations aimed at promoting the development of local producers, such as vocational training centers and job training centers, provision of technological services and governmental development agencies. Several case studies have highlighted the importance of this kind of public support to the activities of the local productive sector.

In contrast, in cases where there are private local governance highlights the role of trade associations and private local development agencies. These institutions act as enablers of the process of local development through actions that foster competitiveness and promotion of the companies.

Therefore, the possibilities of developing the local system depend in large part on the forms of local, public or private governance. The extraction of other benefits, besides the external economies of agglomeration depends on the existence of forms of governance of local productive system that encourage the maintenance of cooperative relationships between agents, leading to the establishment of joint actions between them and increasing the competitiveness of the whole producers.

However, when observing the presence of firm leaders who govern the local system, these forms of local governance can fail. The role of these institutions has been proven by several studies. If leaders, who are able to coordinate many other agents that compose the system, establish conservative strategies, they may hinder local governance and prevent the development of other firms that make up the local production system. [16] refer to these cases as quasi-hierarchy. In general, the clusters of firms that are mostly quasi-hierarchy governance on the local system, the power of the leading companies stems from subcontracting relations, similarly to the systems of the hub-and-spoke type, analyzed by [21].

Long term governance was limited mainly to the constitutional and legal issues regarding the conduct of the State. [38] expanded the concept especially in emerging inter-organizational arrangements, extended from the late twentieth century.

Reference [3] emphasize that in this same time the Cooperation Organisation for Economic Development - OECD had been interested by good governance practices, where perception, based on findings of academic studies, such as the strong direct correlation between mobilization Marketplace mature and reliable capital, business growth and economic development of nations, was the biggest motivation for the interest of the institution by the principles of corporate governance.

Among the points that justified by the interest of the OECD governance issues, the ones that suit the reality of governance in industrial agglomerations are:

- a. Governance needs to be customized to be adjusted to the culture of nations and clusters, thereby warranting differences between recommended best practices; and
- b. Current developments in this field create a space of mutual learning, where interact governments, regulators

of markets, clusters and other parties with an interest and responsibility to correct flawed governance practices.

Therefore, the OECD established a study group and introduced in 1999 as introducing your Principles of Corporate Governance, which summarized and adapted to present as clusters principles:

- a. There is no single model of governance, although they identified some elements in common, each cluster must adapt their application their cultural circumstances;
- b. Clusters need to innovate and adapt their governance practices to remain competitive, with a view to the emergence of new opportunities for growth and capitalization; and
- c. The principles of governance are evolutionary in nature and should be reviewed whenever significant changes occur within the cluster and its surroundings.

The ways of coordinating an arrangement vary according to the type of local productive system, which is determined by the structure of production, territorial agglomeration, organization, market insertion, institutional and social fabric density [34], [35], [36] and [37].

Thus, it is understood as cluster governance the ability to control or coordination that certain actors have on the productive, commercial, technological, and other interrelationships, influencing its development [36]. The concept of governance is based on democratic practices of intervention and participation of different actors in the decision process, which can be public and private companies, consultants, technology development center, workers and citizens, among others [8].

According [30], meet the actors that define the directions of cluster development can only be possible through identification of the governance system deployed in the cluster. Other authors such as [25] and [15], highlight the role of local governance as coordinator of inter-firm activities, resulting in increased competitiveness conference.

Thus, within this perspective of development, competitiveness, collective action, coordination process, technological innovation, among others, it is noticed that the issue of governance is as important as the involvement of local stakeholders for collaborative process actions of groups around individual and collective interests.

References [36] and [37] ensure that the possibilities of development of productive clusters are subject to forms of governance and qualification inherent in the local system. However, according [9], [10] and [2], encountered in the realities of some sectors (industries and markets), the governances in clusters have some differences due to its asymmetry in:

- a. Competitiveness: cost, quality, profitability;;
- b. Technology: products, processes and cost structures; and
- c. Behavioral: strategies.

Besides these differences, [3] consider essential role for actors of good governance integrity and competence as supports constructive engagement. These elements are key to the evaluation of governances.

Reference [36] in his studies on the structure of governances in clusters, reported that some factors determine the form of local governance to promote the development of productive functions in the areas of product development, design, marketing and branding. The authors also consider approaches that analyze the governance and control of information flow and knowledge agent.

According to [11] these skills are related to the form of local governance, the development of joint actions such as the creation of technology centers, business association, among other.

Thus, [30] reported that governance "refers to the structures of power relations and decision-making about the allocation of production factors, involving any set of input-output relations systems" or is, community decisions related to common problems of the companies included in the clusters.

Addition to the companies, institutions support are important actions to promote and strengthen the functioning of the cluster through the generation and propagation of the local tacit knowledge. They are instruments of articulation of interests between the companies, key activities for the business structure of governance of clusters [13] and [17].

The concept of governance is based on democratic practices of intervention and participation of different actors in the decision-making process between agents are public companies, private consultants, technology development center, workers and citizens, among others [8].

References [7] and [8] also refer to the relationship of power that occurs in supply chains and distribution of goods, which can be governed or price mechanisms or strong hierarchies imposed by the participating actors in the process. Furthermore, the possibility of formation of intermediate structures of governance through interactions may result in a greater degree of collaboration and cooperation in relations between companies. This type of structure encourages innovation activity, a result of the social process, collective interactions among actors [19].

Reference [30], in his studies on governance in productive systems, considers the high frequency of derived relations in local productive systems of division of labor between firms. Therefore, an efficient coordination can achieve the union of enterprises and organizations for joint action on behalf of a project. Besides being able to define formal and informal rules that structure social affinities and diversities.

Thus, [14] distinguishes three fields are concentrated where decisions problems for the development of a cluster:

- a. Field of private decisions refers to the responsibility of the individual entrepreneur on what occurs within their own company;

- b. Field of government decisions refers to the three levels of government, traditional public and semi-public services in areas where they are located the cluster; and
- c. Field of community decisions refers to the common members of clusters of problems, in which the resolution of the problem depends on the collective decision, such as: promotion and marketing, technology development, human resource training, environmental protection, technical and administrative assistance between other.
- b. Local context: mainly the labor market and local capabilities, forms of external governance exercised by local or regional institutions, and the qualitative aspects of the interactions of firms [30].

Therefore, can be considered that governances refer to the various ways in which the actors and organizations involved in a cluster, conduct their unusual problems, and perform cooperative actions.

The organization of the cluster can be distinguished by the types of governances in which they are supported on approaches that emphasizes the coordination of economic activities through trade relations, which treat governance in clusters organized in networks of production [30].

References [36], [37] and [1] present a classification in which incorporate three complementary dimensions of private supply chains:

- a. Network: Formed by firms almost same power without domination of the leading companies on the other. Relationship of mutual dependency in order to supplement the expertise and economies of scope and scale;
- b. Almost hierarchical: Existence of clusters of firms that relates to long term, assumes the role of leader, where a subject is another: subcontracted companies; and
- c. Hierarchical: The characteristics of the production system (input-output), strong vertical integration, where the leader sets rules, the product and its specific.

From these attributes, [30] developed a matrix that classifies different empirical experiences, according to their characteristics:

- a. All ring-no core, there is no need for systematic leaders among actors without any kind of hierarchy. Business leaders influence the overall behavior of the industry;;
- b. Core-ring with coordinating firm, with a high degree of hierarchy due to asymmetries between the actors involved;
- c. Core-ring with lead firm, also exhibit asymmetries and hierarchical relationships, but there is a dominant leader;;
- d. All core-no ring, large vertical company, where hardly checks the formation of clusters of companies, which chooses the integration of productive resources.

Although [36] and [37] and [1] acknowledge being incomplete, this classification is an important contribution to the analysis of the forms which constitute the relationships between companies. Thus, this analysis should be complemented with other elements such as:

- a. View of the region: indicating the extent of agglomeration and the division of labor, the degree of hierarchy, and the interactions are local or nonlocal; and

These ratings submitted by [30], are important for shaping the inter-company relations, assisting the development of the cluster in relations to the intended objectives.

Therefore like the aforementioned hub-and-spoke [20] and [21] other forms of cooperation are responsible for the coordination of clusters, besides stimulating competitiveness and transmission of knowledge among local manufacturers:

- a. Vertical bilateral, where companies seek to lessen innovation cycles;
- b. Horizontal bilateral, where companies come together to develop a specific work;
- c. Horizontal multilateral, which involved public and private stakeholders and participation of competitors are; and
- d. Vertical Multilateral, where different actors cooperate supply chains.

Reference [36] consider that the form of governance, public or private, may enable the development of local arrangement, besides encouraging the maintenance of cooperative relations of actors, causing joint actions, resulting in increasing the competitiveness of the set of manufacturers.

The coordinated actions by the public sector stand out for creating and maintaining organizations aimed at promoting the development of local producers. The actions of the private sector, we highlight the role of trade associations and private agencies, as catalysts for development and encouraging local development, with no hierarchies or leaders, only the equality relation. Forms of local governance can be established by the public or private sector, or even by both parties. However check up hybrid forms of coordination [11].

Therefore, governance in clusters provides collaborative work between various actors seeking regional empowerment. Thus the agents involved in clusters can be strategic differentiators that contribute to improving local competitiveness.

The governances in clusters can be distinguished in structure types and forms. To [36] the existence of a structure and its shape depends on some factors such as:

- a. Number and size of companies;
- b. Type Product or local economic activity and related technology;
- c. Form of organization of local production;
- d. Form of market integration;
- e. Domain capabilities and strategic assets of technological, commercial (brands and distribution channels), productive or financial;
- f. Local institutions with political, economic and social representativeness, interacting with the public sector;
- g. Social context / cultural / political.

Addition to these factors, the presence of intermediary institutions in the establishment of a governance is essential to promote actions for development of trustworthy companies in their local environment by strengthening the cluster through cohesive strategies for grouping together of.

III. METHODOLOGY RATIONALE

This paper presents some results of an exploratory study that used the method of in-depth interviews with some actors of the sector analyzed. An exploratory study is justified by the need for a better understanding about the complex and under-explored phenomenon of the governance in clusters. The objects of this study are various actors involved in the software cluster in the city of Ribeirao Preto.

A literature research was conducted to explore the scientific contributions on the concepts here discussed and used information from monographs and journals of those areas. In addition, the documental and case study research have carried out to gather information about the companies, hierarchy, leadership, command, cooperation, competitiveness etc. It is based in the analysis of internal reports, cases, researches, publications etc.

The case study was chosen due to the necessity of a deeper investigation about the most significant characteristics of the governance in the software cluster in city of Ribeirao Preto in particular those related to: i) the Locality and its Industries; ii) Learning and Health; iii) linkages and networks; iv) production governance; v) public policy.

The study was carried out with people that are directly related to the cluster management. The adopted data-collection methods were half-structured interviews and direct observation. The interviews were made with managers of companies and other parties involved with the software cluster here discussed.

IV. RESULTS

This section presents some initial results inferred from the research about governance in the software cluster in city of Ribeirao Preto. The central objective of this stage of the study was to understand some key points about the governance structure of the software cluster here discussed. The following section presents the main remarks. It is important to emphasize that the following observations came from initial studies, and that more data is necessary to consolidate the results and to structure a comprehensive theory.

Based on the theoretical framework presented and considering the factors that determine the form of governance in clusters, this section summarizes the results of a case study on the existing software industry in the region of Ribeirão Preto, where the structure of local governance was implemented after the definition, by a group of local businesses, a coordinator agent. It is emphasized that the discussion is necessarily brief and focused on aspects related to governance.

Ribeirão Preto is a Brazilian city in the State of São Paulo, 310 km distant from the local capital. In 2012 its population was estimated by IBGE (Brazilian Institute for Geography and Statistics) in 619,746 inhabitants (eighth most populous city in the State of Sao Paulo), with 99.7% of its population living in urban areas.

Ribeirão Preto was founded in 1856 as a typical agricultural town. However, in the second half of the 20th century it began to receive investments in the areas of health, biotechnology, bioenergy and information technology. Besides being a national reference in the health sector, Ribeirão Preto has been gaining attention in the software industry¹.

In this sense, PISO² was established in 2004 through the initiative of nine companies as a nonprofit association. PISO has received nationwide recognition because of its work for the progress of the IT sector and professional software industries, turning Ribeirão Preto into a national hub concerning these activities.

In the region of Ribeirão Preto, according to data from RAIS³ (2012), there were in 2010 around 98 software companies, mostly small and micro enterprises⁴. Also, it is noteworthy that many companies in the software have emerged as spin-offs from local universities. The SUPERA⁵, held by FIPASE⁶, has contributed to nascent software companies by offering managerial support in their early stages of operation, increasing the chances of success. In early 2012, there were nine software companies incubated, associates or already graduated in SUPERA.

Ribeirão Preto is the city in the State of São Paulo with the largest number of companies with MPS.BR certification (24 companies). This certificate is issued by Softex⁷, in partnership with the Ministry of Science, Technology and Innovation, related to software process improvements. This aspect reflects a an important feature of the software sector in Ribeirão Preto, since investment in signaling mechanisms such as MPS.BR represents higher quality standards in products and services, as well as long-term planning and the pursuit of competitiveness in international markets.

¹ The region's software companies work primarily with software for managerial tasks. The most relevant competitors are multinational companies with offices in Brazil.

² "Software Industrial Pole" of the region of Ribeirão Preto is a nonprofit organization that aims to professionalize the Ribeirão Preto region, and software industries. The organization was founded in May 2004 through the initiative of nine companies software

³ RAIS is a governmental initiative in Brazil that aims at collecting and distributing yearly data and reports regarding the national social environment.

⁴ Among the software companies in the region, 43 are associated with the PISO, which represents roughly half of the total population of enterprises.

⁵ Business Incubator of Technology nonprofit organization that provides support for the creation of new businesses offering physical space for development, basic services, advice, training and networking.

⁶ Foundation Institute for Advanced Health, provides support to companies in the health sector and the management of business incubator - SUPERA

⁷ Softex is a Brazilian association that functions as a catalyst for the national ICT sector regarding sectoral support for increasing competitiveness in indigenous firms.

This scenario results in the set of factors that influence governance that, in the case of Ribeirão Preto, appear relatively favorable, mainly because that is not the case some few large companies dominating the sector.

Also as favorable aspect the form of local governance in Ribeirão Preto is one that refers to the development and effectiveness of local institutions, both associative character as the provision of services to companies based in the city. The first floor has an active role with the sector and other local or foreign institutions.

The social / cultural / political context of the city of Ribeirão Preto has changed positively. As [27] reminds us, so there is an effective division of labor and cooperation between companies is essential to have confidence. In Ribeirão Preto, socio-cultural and personal relations bonds guaranteed from the outset the existence of trust between companies. However, it is important to pay attention to the possibility of a group of local companies, especially larger, go to dispute control of the sector, being able to break the trust in the cluster. So prevalent in Ribeirão Preto an environment marked by a spirit of association and on cooperation between enterprises.

Before any other consideration, it must be clear that the issue of governance in clusters arises only when local actors seek to go beyond the use of local from external economies of agglomeration competitive advantages and try to take collective initiatives or develop joint actions, narrowing their interdependencies in order to achieve collective efficiency [28].

These initiatives or joint actions can have several goals, but generally aim at training, among other things, central purchasing of raw materials, export consortia, technology centers for collective use, creation of educational institutions and vocational training, creating local brand name, network development or distribution systems themselves.

The governance structure in the software industry in Ribeirão Preto has proven crucial and form it takes is closely related to a complex set of factors that are analyzed below:

- a. Predominance of small companies, being more favorable to collective initiatives and joint actions. It is interesting to note that the presence of large firms in a cluster, according to several published reports, may hinder the process of governance. As previously mentioned, According to data from [26], in 2010 there were around 98 software companies, mostly small and micro enterprises, employing around 2000 employees. Also, it is noteworthy que many companies in the software have emerged the spin-offs from the local universities. In this scenario, there is an active leader that takes the governance of the cluster, but is an association representative of several micro and small enterprises, defending their interests to act strongly in the development of the sector, so collaborative and healthy.
- b. Specific features of the software industry, which determine the different possibilities for cooperation in strategic activities such as training of skilled labor,

training programs, technology forums or research and development activities. Products or more intensive activities in knowledge are less amenable to cooperation in R & D, but in the case of Ribeirão Preto, the software industry has its own dynamic, with a high demand for their services, and performance of firms in markets very specific that reduce the climate of fierce competition between them, with a large and unmet demand to be met in various industries that require software development, and the need for qualified professionals to work in jobs not occupied.

- c. The organizational form of local production: when vertical integration prevails, the command is the very large vertical company and therefore the issue of governance does not arise. Forms of organization in which some companies coordinate networks of subcontractors or contract manufacturers, as well as those in which a leading company runs a chain of production with specialized suppliers, leave little room for governance than that exerted by the company coordinating or leading company . On the other hand, in the analyzed case are mainly small and medium-sized independent companies without large asymmetries with several collective initiatives in local governance by centralized association created by the actors of the sector (PISO);
- d. Similarly, the way local companies are inserted in the markets has implications about the form of governance. When local businesses are subject to large networks, national or international, their autonomy is very limited, and command belong to networks or brands hold leading companies or subsidiaries of global chains. In the cluster of Ribeirão Preto software, there are local companies that develop their own marketing channels, with own brands and products, with a more favorable local governance. It should be noted, however, that between these two extremes there is a variety of hybrid forms of integration and, consequently, different forms of governance, as already pointed out by [16];
- e. Absence of companies that dominate capabilities and strategic assets of technological, commercial, financial or productive, which facilitates the organization of local businesses to coordinate collective initiatives in joint actions undertaken by constantly PISO. Thus, there is not a command of information flows on the local system, hierarchical, parameterized and considered non-strategic;
- f. Existence of local institutions with political, economic and social representativeness, interacting with the productive sector. There is a dense institutional fabric, with strong representation and in tune with the activities of the cluster, constituting itself as an indispensable tool for local governance element in this situation, in which micro and small enterprises predominate; and
- g. The local social-cultural and political context presents itself as a major influence governance cluster. It is this specific context that comes important basic elements of governance PISO: the existence of solidarity, the tendency

for social cohesion, confidence gained through frequent interactions, and the emergence of local leaders. These are characteristics that are strongly held and are part of history and the local context. Can hardly be transplanted or imagined as generic attributes agglomerations in general.

Thus, it is proposed, according to figure 1, consider the following key elements of the governance cluster, suggested by the United Nations model, and supplemented by the concept of triple-helix:

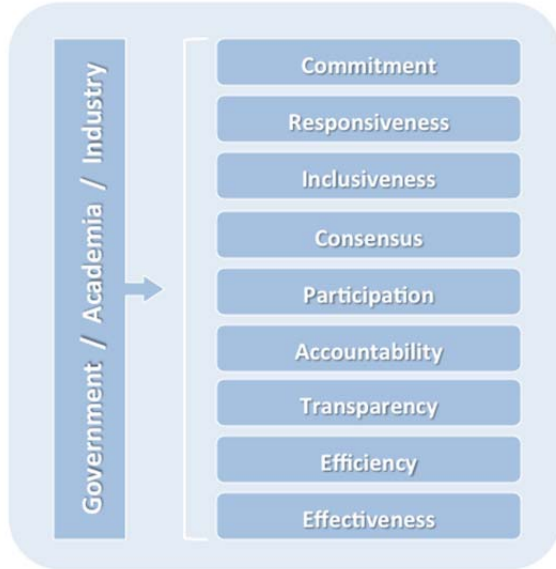


Figure 1: key elements of the governance cluster

V. CONCLUDING REMARKS

Based on established analytical approaches and evidence, this study aimed show that governance in cluster analysis is conditioned by characteristics or factors specific to the sector and the region analyzed. Also tried show, which is the form of local governance, and not one whose command is exercised by leading companies, which is relevant from the point of view of coordination of collective actions and cooperative activities in the cluster. Therefore, it is understood that initiatives by private institutions or public bodies aiming to governance in the cluster must be preceded by its characterization in terms of the factors that influence local governance. These constraints, as noted, include:

- a. Production structure, especially as the number of companies and their distribution by size;
- b. Nature of economic activity and its technological base;
- c. Form of organization of production and division of labor in the arrangement;
- d. Way of trade integration in the local markets;
- e. Whether or not companies that dominate capabilities and strategic assets;
- f. Locations, their degree of development and interaction with the sector institutions; and

- g. Social context / cultural / political and characteristics as associations, solidarity, social cohesion, confidence and ability to generate local leaders.

Overall, based on the literature on governance of clusters, it is understood that clusters composed predominantly of large dominant companies, inserted into global production chains / supply or commercially subordinated to large retail chains, which is not the case of Ribeirão Preto, leave little room for forms of local governance, unless there is political will and a serious purpose of large local companies and their coordinating or leading companies as well as local private and public collective actors, in order to redirect the development of Cluster.

The counter-example of this type of situation is well illustrated by the case of Ribeirão Preto software industry. In clusters with a predominance of micro / small and medium enterprises or production structures without major asymmetries, with product that favors the division of labor and the formation of the productive chain, less subordinated in terms of trade integration with dense tissue institutional context and social / cultural / politician who values the associations, solidarity and trust, and generates local leaders, are more conducive to successful forms of local governance. This can take the form of an associative-cooperative model, or private and public local governance model with coordinating agent, as in the case analyzed.

Is important to note the presence of any difficulties in the governance structure, which depends on a complex set of factors, among which:

- a. The number and size distribution of local businesses: production structures where small businesses predominate tend to be more favorable to collective initiatives and joint actions, whereas the presence of large companies or companies that dominate important links in the supply chain can hinder governance;
- b. The type of product or local economic activity and its technological base, which depends on whether or not there is division of labor, interdependencies between local companies, formation of networks of specialized suppliers, or even the establishment of a production chain. Condition is also the possibility of cooperation in strategic activities such as R & D. Products or more in knowledge intensive activities are less propitious cooperation in R & D, whereas products are more favorable to such cooperation mature technological base, at least in pre-competitive stages;
- c. The way it organizes local production can also be an important determinant of the form of governance. When vertical integration, command and own large vertical company and therefore the issue of governance prevails even arises. Forms of organization in which some companies coordinate networks of subcontractors or contract manufacturers, as well as those in which a company-leader commands a production chain with specialized suppliers, leave little room for governance

than that exerted by the very company leader. On the other hand, forms of organization in which small and medium enterprises predominate autonomous without large asymmetries, are more conducive to collective initiatives under some form of local governance;

- d. Similarly, the type of participation of local companies in markets has implications on the form of governance. When local businesses are subject to large retailers, national or international networks, modular production networks and global supply chains, and very limited autonomy and command belong to networks or detaining leading brand companies or subsidiaries of global chains.

After verified the possibility of structuring a form of local governance, mediation for the policies themselves should be taken, ie, what are the goals you should pursue local governance, and how policies or arrangements for local production systems can be mobilized to achieve these goals.

A necessary first consideration is that there are different types of agglomerations from those embryos to advanced ones, and each type there are different degrees of development. In this direction, a basic premise for the policy should be that there are priorities and appropriate for each type of intervention, which should consider an "intervention model" moments whose technological development, for example, can not occur unless there has been prior a thrust on the quality.

In general, policies for clusters should consider to encourage private and public local governance with shared initiatives directed local actors to enter the system or local arrangement most advanced technical and industrial skills and technological element as competitive strategy.

It is understood that in an environment that combines elements of both competition and cooperation, the technological dimension is that which, par excellence, provides interim benefits that encourage companies to seek other instruments to imitate and surpass the positions of rivals. In this sense, the strengthening of the position of enterprises and more directed to the technological dimensions environments should stimulate a gradual accession of the other agents in this competitive standard.

Public initiatives promoting innovation and technological capability in clusters can thus ensure greater efficiency, as could stimulate more advanced initiatives and, with them, infecting the collective environmental effect mechanisms of competition and cooperation.

There are at least three dimensions of performance priority of public policy to promote the systems and local productive arrangements. The first is formed by positive externalities, especially technical and technological nature. Most clusters, unlike the case analyzed, shows relatively low levels of technicization and they are not always in line with the standards required by markets, mainly external. Therefore, a first action refers to the dissemination of basic industrial technology in Clusters. This process could be adjusted to each of the types of arrangements, from the

simplest to the most complex.

In the simplest cases, encouragements that enabled technological extensionism would be of great value, along with the dissemination of tools, techniques and procedures to quality, including its accreditation. In the past, technological extensionism and basic industrial technologies still play important roles, but there are more important areas for technological laboratory and development of products and processes. As much as the different clusters of the same sector have different profiles, they share a common industrial base and therefore can benefit from the same set of externalities. The optimization of these collective externalities allocated to public and private resources can not ignore that the proximity to users is an essential ingredient of the learning process and local development. It is vital that governance itself is established in order to prevent the differential access to its resources becomes a distinct advantage for some and a barrier for others one.

The second dimension relates to access to credit. Most clusters have their own funding mechanisms, partially collective nature. Once the cycles of business investment are not entirely coincidental, the credit mechanisms between individuals eventually form the basis of credit and financing system of own resources side, often immobilized in personal ways of " saving " and the " investment ". Loans and financing combine elements of personal and family nature with ingredients from local offset liquidity. However, although it represents a functional workaround for the lack of resources and inadequate credit and financing, this model has shortcomings and weaknesses. The main one associated with this inability to supply the resources for a synchronized expansion of enterprises. And that is exactly what companies should always need that economic growth or exports give rise to significant opportunities.

For this reason, there must be a concern with the creation of credit and financing mechanisms to ballast most significant efforts to grow these businesses located in clusters. This could be done in the context of industrial policy on capital goods, through programs that articulate both the dimensions of quality and technical standards with access to financing for the acquisition of technology and knowledge, joining the two ends - supply and demand - and creating mechanisms for the existence of harmony between Industrial, Technological and Foreign Trade.

The third dimension refers to the creation of collective exporting capabilities, which goes far beyond efforts, important and commendable, that Sebrae⁸ and Apex⁹ perform. This process could originate from a gifted exporting entity, especially commercial capacity. The capital for its

⁸ O Sebrae é uma entidade privada sem fins lucrativos criada em 1972 com a missão de promover a competitividade e o desenvolvimento das micro e pequenas empresas e fomentar o empreendedorismo.

⁹ Agência Brasileira de Promoção de Exportações e Investimentos: tem a missão de promover as exportações dos produtos e serviços do país, contribuir para a internacionalização das empresas brasileiras e atrair investimentos estrangeiros para o Brasil.

formation and initial operation would come from local businesses, and its main suppliers would be the public authorities (Bank of Brazil, BNDES, regional banks, local development agencies) and investment funds (public, private, mixed). Developed capacity to trade, the trader-export would act as contractor production. The demand for qualified demanding markets necessarily would require corresponding efforts technical skills on the part of subcontracted local firms.

Importantly, this study has its limitations. The results are based on a case study without appropriate quantitative and objective measurements that allow cross-checking of information provided. In addition, a static analysis complicates the assessment of trends which evolve over time. The findings, therefore, should be taken as explanatory information for guiding future research similar contexts, functioning as an initial analytical framework. Avenues for further assessments in the realm of centralized bodies of governance in clusters should be oriented towards ex ante and ex post (regarding the implementation of this body) evaluations of Collective Efficiency in industrial agglomerations.

REFERENCES

- [1] Albertim, M. O processo de governança em arranjos produtivos locais: o caso da cadeia automotiva do RGS. Tese de Doutorado. Porto Alegre, UFRGS: 2003
- [2] Amato Neto, J. Redes de cooperação produtiva e clusters regionais: oportunidades para as pequenas e médias empresas. São Paulo; Editora Atlas: Fundação Vanzoni, 2010.
- [3] Andrade, A. Rossetti, J. P. Governança corporativa: fundamentos, desenvolvimento e tendências. São Paulo: Atlas, 2007.
- [4] Campos. A. C. Arranjos produtivos no Estado do Paraná: o caso do município de Cianorte – PR. In Concurso IEL – Paraná de monografia sobre a relação Universidade Empresa, Curitiba: IEL, 2006.
- [5] Casarotto Filho, N. Pires, L. H. Redes de pequenas e médias empresas e desenvolvimento local: estratégias para conquista da competitividade global com base na experiência italiana. São Paulo. Editora Atlas, 1998.
- [6] Casarotto, N., Pires, L.H. *Redes de Pequenas e Médias Empresas e Desenvolvimento Local: Estratégias para a Conquista da Competitividade Global*. Atlas, São Paulo, 2001.
- [7] Cassiolato, J. E. ; Szapiro, M. H. S. Uma caracterização de arranjos produtivos locais de micro e pequenas empresas. In; LASTRES, H. M. M.; Cassiolato, J. E.. *Pequena empresa: cooperação e desenvolvimento local*. Relume Dumará Ditora, 2003.
- [8] Cassiolato, J. E.; Lastres, H. M. M.. *Aglomerados, cadeias e sistemas produtivos de inovação*. Brasília: IEL, 2001.
- [9] Cassiolato, J., Lastres, H. O enfoque em sistemas produtivos e inovação locais. In: Fischer, T. (ed.). *Gestão do Desenvolvimento e Poderes Locais: Marcos Teóricos e Avaliação*. Casa da Qualidade, Salvador, 2002.
- [10] Cassiolato, J., Lastres, H. O foco em arranjos produtivos e inovativos locais de micro e pequenas empresas. In: Lastres, H., Cassiolato, J., Maciel, M. (eds.). *Pequenas Empresas: Cooperação e Desenvolvimento Local*. Relume Dumará, Rio de Janeiro, 2003.
- [11] Garcia, R.; Motta, F. G.; Amato Neto. J. Uma análise das características da estrutura de produção e suas relações com a cadeia global. *Rev. Gestão & Produção*, v. 11, n.3, p 343 – 354, set-dez, 2004
- [12] Gereffi, G. 'The Organization of Buyer-Driven Global Commodity Chains: How U.S. Retailers Shape Overseas Production Networks', in G. Gereffi and M. Korzeniewicz (eds), *Commodity Chains and Global Capitalism*, Westport: Praeger, pp. 95–122, 1994.
- [13] Gomes, P. A.; Schlemm, M. M. Arranjos produtivos locais e governança. XXIII Simpósio de Gestão da Inovação Tecnológica. Curitiba, 2004.
- [14] Haddad, P. R. Texto de referencia da palestra sobre cultura local e associativismo de 27/10/2004. Seminário do BNDES sobre Arranjos Produtivos Locais. Belo Horizonte, 2004.
- [15] Humphrey, J.; Schmitz, H. Developing country firms in the world economy: governance and upgrading in global value chains. Institut für Entwicklung und Frieden der Gerhard – Mercator – Universität Duisburg, 2002.
- [16] Humphrey, J.; Schmitz, H. Governance and upgrading: linking industrial cluster and global value chain research. IDS Working Paper, n. 120, 2000. Brighton: Institute of Development Studies, University of Sussex, 2000.
- [17] Lastres, H., Cassiolato, J. E. Novas políticas na era do conhecimento: o foco em arranjos produtivos e inovativos locais. *Parcerias Estratégicas*, 17, 5-29, 2003.
- [18] Lombardi, M. The evolution of local production systems: the emergence of the “invisible mind” and the evolutionary pressures towards more visible “minds”. *Research Policy*, v. 32, n. 8, p. 1443-1462, 2003.
- [19] Lundvall, B-Å. National systems of innovation: towards a theory of innovation and interactive learning. London: Pinter Publishers, 1992.
- [20] Markusen, A. Sticky places in slippery space: a typology of industrial district. *Economic Geography*, 72(3), 293-313, 1996.
- [21] Markusen, A. Áreas de atração de investimentos em um espaço econômico cambiante: uma tipologia de distritos industriais. *Nova Economia*, Belo Horizonte, v. 5, n. 2, dez 1995.
- [22] Marshall, A. *Industry and Trade: A Study of industrial technique and business organization; and of their influences on the condition of various classes and nations*. MacMillan, London, 1920.
- [23] Marshall, A. *Principios de Economia: Tratado Introdutório*. Nova Cultural, São Paulo, 1985.
- [24] Porter M. E. Estratégia competitiva: técnicas para análise de indústrias e da concorrência. 7. Edição – Rio de Janeiro: Editora Campus, 1986.
- [25] Porter, M.E. Clusters e Competitividade. *HSM Management*. 3(15), 100-110, 1999.
- [26] RAIS. *Relação Anual de Informações Sociais: microdados*. Governo Federal, Brasília, 2012.
- [27] Schmitz, H. Global competition and local co-operation: success and failure in the Sinos Valley, Brazil. *World Development*, 27(9), 1627-1650, 1999.
- [28] Schmitz, H.; NADVI, K. Clustering and industrialization: Introduction. *World Development*, v. 27, n. 9, 1999.
- [29] Scott, A.. The geographic foundations of industrial performance. In: Chandler, A.; Hagstron, P.; Solvell, O., (eds.). *The dynamic firm: the role of technology, strategy, organization, and regions*. Oxford: Oxford University Press, 1998.
- [30] Storper, M., Harrison, B. Flexibility, hierarchy and regional developments: the changing structure of industrial production systems and their forms of governance in the 1990s. *Research Policy*, 20(5), 407-422, 1991.
- [31] Sturgeon, T. Turn-Key Production Networks: A New Model of Industrial Organization? *BRIE Working Paper n.92A*, 1997.
- [32] Sturgeon, T. Does manufacturing still matter? The organizational delinking of production from innovation, BRIE Working Paper, n. 92b, aug 1997.
- [33] Sturgeon, T. Modular production networks: a new American model of industrial organization. *Industrial and Corporate Change*, v. 11, n. 3, pg. 451 – 496, June 2002.
- [34] Suzigan, W., Furtado, J., Garcia, R., Sampaio, S. Sistemas Locais de Produção: Mapeamento, Tipologia e Sugestões de Políticas. *Anais do XXXI Encontro Nacional de Economia*, Porto Seguro, December 9-12, 2003.
- [35] Suzigan, W., Garcia, R., Furtado, J. Governança de sistemas produtivos locais de micro, pequenas e médias empresas. In: Lastres, H., Cassiolato, J., Maciel, M. (eds.). *Pequena empresa: cooperação e desenvolvimento local*. Relume Dumará, Rio de Janeiro, 2003.

2014 Proceedings of PICMET '14: Infrastructure and Service Integration.

- [36] Suzigan, W.; Garcia, R. Furtado, J. Estruturas de governança em arranjos ou sistemas locais de produção. Revista Gestão & Produção. São Carlos, v. 14, n12, p 425 – 439, maio-ago 2007.
- [37] Suzigan, W.; Garcia,R.; Furtado, J. Governança de sistemas de MPME em clusters industriais. In.: políticas para promoção de Sistemas Produtivos Locais e MPME. Rio de Janeiro: 2002. Disponível em: <http://www.ie.ufrj.br/redesist/NTF2/NT%20Suzigan.PDF>
- [38] Williamson, O.E. *The economic institutions of capitalism*. Free Press, New York, 1985.