The role of cities in decentralization of national policies on science, technology and innovation[1]

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Abstract

Purpose of the paper: *This paper discusses decentralization of national public policies on Science, Technology, and Innovation (ST&I) from the federal to the city government.*

Methodology*: Empirical data is provided by the case studies of two Brazilian cities: Porto Alegre and São Leopoldo, which were selected because of their comparatively good results in promoting companies and ecosystems of innovation regarding other Brazilian cities.*

Findings*: The main conclusions of the study are: (a) federal government public policy promotion in ST&I remains crucial to the development of entrepreneurial technologically-based ecosystems; (b) municipalities are capable of mobilizing resources, structuring incentive mechanisms, articulating actors, and organizing governance systems; (c) decentralization via municipalities can improve capillarity and effectiveness, strengthening regional innovation systems and consequently complementing national ST&I policies; (d) increased political and economic power of city governments can promote improvements in federal policies of ST&I.*

Research limits*: This study requires further empirical validation and analysis of evidence of other initiatives of ST&I decentralization*

Practical implications*: The study provides managerial implications suggesting how ST&I should be organized in a city to improve a tech-based business ecosystem.*

Originality of the paper*: Governments around the world have been supporting companies and innovation ecosystems because of their relevance to economic viability and national sustainable development. However, despite the increasing political, social, and economic relevance of cities worldwide, their role has been underestimated in national ST&I policies. In this context, this study considers how municipal decentralization of national ST&I policies enhances capillarity, efficiency, and the strengthening of regional systems of innovation.*

Key words: regional economy; digital economy; science and technology management; public policies; federative decentralization; tech- based business ecosystems.

1. Introduction

Cities are increasingly occupying a key role on the development of global talent and knowledge economies. There is a widely-recognized

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literature about smart cities considering the use of information technology and other means to improve efficiency and quality of life. Nevertheless, there is a lack of studies about how a city performs its role as an economic and political actor in national innovation systems to promote technology goods and services industry. This paper aims to fulfill this gap regarding the role of the city in the improving Science, Technology, and Innovation (ST&I) policies and tech-based business ecosystems.

In knowledge economies, cities have been acquiring renewed economic, social, and political relevance. To some extent, they are recovering the historic concept of world-cities like Florence, Venice (1378-1498), Genova (1557-1627) and Amsterdam (1585-1773). However, unlike the past, today's global cities are integrated into networks (Castells, 1999). Although physically distant, the cities today are connected by instant digital communication, creating an unprecedented dynamic momentum in the history (Sassen, 1999).

"If the 19th century was the century of empires and the 20th century was the century of the nations, the 21th century will be the century of the cities", summarized Wellington Webb, the mayor of Denver (Scrimger and Jubi, 2000). In 2008, for the first time in history, most people in the world began to live in cities (United Nations, 2008). As cities grow, they occupy more than ever a central place in the world, with greater economic, political, and technological power. Thus, the challenge of governments at all levels (municipal, state, federal), including transnational, is increasingly to solve the problem of cities. According to Bloomberg (2011), the mayor of New York, one cannot wait for national government decisions; cities are vulnerable on the front line because national governments are not doing what they should do. Therefore, cities need new income sources and a more dynamic economic matrix. They need to attract business, to face a competitive global economy, as well as to provide an effective and sustainable infrastructure (Dirks and Keeling, 2009), attracting technology-based business as a strategy to boost their economic matrix.

Since the 80's, knowledge has been an important factor in explaining the disparities among countries beyond the traditional factors of capital and work. Developing countries that have adopted policies of ST&I promotion are those that have progressed more rapidly in recent years showing that this is a vast and complex challenge that can be met through a large political mobilization for Science (UNESCO, 2010). Accordingly, governments throughout the world have been supporting technology companies to maintain competitiveness in an increasingly global economy (Sassen, 2009) Countries, including developed ones, support technology companies in many ways, such as through governmental policies in strategic areas and through infrastructure projects, where the State assumes part of the technological risk (Mazzucato, 2011). Thus, the state has a structuring role of the new productive forces as a driver of the diffusion of innovations in society.

In some sectors like health and education, the decentralization, of federal functions to the city level has been recognized for its positive results. However, policies on ST&I, despite clear improvements in different countries, are still excessively centralized at the federal level, which limits

capillarity and efficiency. Despite the recognized importance of smart cities and tech-based business ecosystems to economic and social development, there is a lack of literature and empirical data, answering the question: "What is the role of cities in national ST & I policies and how should it be structured to promote technology-based business ecosystems?". The present article aims to fulfil this gap by discussing the role of cities as a key actor on ST & I policies and actions. The discussion considers evidence of the case-studies of two cities with different sizes, but both well succeeded in creating a tech-based ecosystem, including internationally recognized science parks. Although studying Brazilian cases, this paper offers contribution to the need of reconfiguration of ST & I systems in different contexts.

In the following sections, we highlight key aspects of studies that support the assumption of the new economical relevance of cities in a knowledge economy; then, we present aspects about federative decentralization and the regulatory frameworks related to the public ST&I policies. Finally, we explore the data on the cases of the two Brazilian cities, which have shown comparatively good results in promoting ST&I ecosystems as compared to other Brazilian cities. As final considerations, we present propositions for a model of decentralization of ST&I national policies to the municipal level.

2. Cities in the knowledge economy

Smart cities literature deals with the management of the city using "intelligent" resources, such as digital technologies in its administration and in the provision of services to the citizen, e.g. e-governance systems. The intelligent city appears in the international academic literature with various terms: smart, innovative, sustainable, digital city, among others. In an intelligent city, investments in human capital, social welfare, and traditional infrastructure (such as land use, mobility, and urban equipment) and innovations (such as information technology, telecommunications, and the Internet) can promote sustainable economic growth and high quality of life, under wise management of natural resources and participatory governance (Caragliu *et al.*, 2009; Tregua *et al.*, 2015). Align to this stream, Sandulli *et al.* (2016) propose public-private alliances (PPP) as an essential requirement for successful Smart City projects reinforcing the main assumption of this paper that cities are key agents in the transformation of modern economies.

According to the seminal work from Thisse (Beckmann and Thisse, 1987), economic activity is not concentrated at a single point, nor is it distributed spatially in a uniform way. Instead, it is distributed unevenly, creating places more developed than others. In the 50's, the idea of regional development was based on the economic theories of the agglomeration factor in Perroux's (1982) theory of the regional pole and in Myrdal's concept of cumulative circular causation (Myrdal, 1957). This model has inspired the construction of industrial districts in various parts of the world, including Brazil, between the decades of the 50's and 80's (Monasterio, 2011; Paiva, 2004).

Theories differentiate between the concepts of regional and economic space. Region refers to a continuous territory delimited by geographical boundaries. Economic space, on the other hand, deals with scattered poles interconnected by networked economic affinities, as described by Castells (1999). In a tech-based city business ecosystem the availability of skilled workers class grows in importance. A skilled worker can change jobs from a local company to one in a distant country without leaving his desk. The modeling of a knowledge economy, for instance, must consider a unique dichotomy, where labor mobility has two dimensions: the "*hypermobility*" of the teleworking capacity (Sassen, 2009) and the physical mobility of the individual himself (Florida, 2008). With this perspective, Weiss (2006) explains the virtuous spiral of the knowledge economy cities by the "principle" of *critical mass*, a phenomenon characteristic of urban centers, which simultaneously concentrates many people with great expertise (vertical competence) and a plethora of diversity in complementary knowledge (horizontal competence). This "*wide range of highly specialized skills mixed together*" in cities generate productivity and innovation corresponding to up to 85% of the GDP in developed countries.

Sassen (2009) studied the trends that created the agglomeration of cities. New communication technologies, transport and Internet explain urban concentration. These technologies might suggest, in a more obvious manner, centrifugal forces of decentralization, such as teleworking in urban offices, which tends to produce a movement of people from the center to the periphery. Paradoxically, there are forces, which lean towards centralization. In the opposing direction, the facilities of remote management allow that a greater number of companies may expand activities in other distant places in search of factors of knowledge economy: new markets and specialized people. In short, the more powerful the new technologies are, the greater the distant management capability is; therefore, it is easier to extend operations globally, creating new centers of density and centrality as demonstrates the case-study in this article.

The *mix* of companies, talent, and *expertise*, covering a wide spectrum of knowledge fields, make the city a complex center of strategic information exchange, subject to uncertainty, lack of structure and complexities. The city becomes an intense and dense center of a certain type of information exchange that cannot be fully replicated in the virtual space and requires face-to-face contact. These ties of talented people and unforeseen and unplanned information exchange add value in a virtuous cycle that produces higher-order information in a continuous and feedback process. This dynamic environment allows people to find information they did not know they needed. Cities promote unscheduled, spontaneous, and random meetings as a "coffee room effect" (Fu, 2007). The more concentrated the agents are, the more "luck" they will have in accessing the "cafeteria type of information" and, therefore, the greater the dissemination of new knowledge in the local cluster.

Despite globalization, which has increased commonalities in everyday living for much of the world regardless of one's location, it has never been as important to choose the city where you live, almost as much as one's career (Florida, 2008). The more knowledge-intensive innovation activities are,

the greater the need for spatial proximity (Amdam, 2003). "Surprisingly, the newer technologies allow global dispersion of corporate activities, the more they produce density and centrality", summarizes Sassen (2009), creating economic agglomerations in new urban *clusters*, some of them in countries distant to the companies' headquarters. At the next section, we discuss the role of the cities in ST&I policies.

3. The decentralization of national policies and the role of the cities in the ST&I policies

Political science has a long tradition of debates and controversies regarding the optimal level of government that should be responsible for decisions and implementation of public policy in support of its citizens. In this debate, "who" does is as important as "what" must be done by the State (Ceneviva, 2010).

Thus, decentralization deals with the vertical structure of the public sector. It explores, in both normative and operational terms, the roles of the different levels and intergovernmental relations established between them (Oates, 1999; Arretche, 2004), to pursue common goals that would hardly be achieved by either party alone.

The work of Hayek (1945) argues that local governments have a more precise, detailed knowledge of the local population, and therefore are more capable than central governments in providing services to citizens. Tiebout (1956) suggests that decentralization allows each region to offer a package of benefits and taxes, creating healthy competition among them and allowing citizens to choose the jurisdiction that best meets one's expectations and needs. According to this theory in the political economy field, known as *public choice theory*, individuals and governments are rational agents, guided by self-interest and involved in complex interrelationships processes in search of a balance between costs and benefits to get them.

Decentralization assumes the existence of a central authority, which deems necessary - or unavoidable - the delegation of their powers to government's sub-national levels in favor of a more appropriate management or in response to sub-national pressures (Duchacek, 1970). Decentralization also increases the possibility of social participation in local decisions making the government more transparent and "auditable" by their constituents (Oates, 1999). In this same vein, Stuart Mill verified that decentralization promote the citizens' greater political and civil participation, increasing their level of "civic education", helping to choose their representatives and improving the allocations of public resources (Oliveira, 2007).

As Alexis de Tocqueville observed more than a century ago, the federal system was created with the intention of combining advantages at different levels. For this purpose, it is necessary to evaluate which features and instruments are best suited for each level. Thus, decentralization explores, in both normative and operational terms, the roles of different levels and intergovernmental relations between them (Oates, 1999), in pursuit of common goals that would hardly be achieved separately.

The literature shows that decentralization can establish a new balancing point in the power asymmetry between both entities federal and municipal as exemplified by the Canadian experience of Keith Banting (2004). When the federal government attempted to cut social spending, provincial governments, realizing that they would be electorally harmed, used their political power to oppose the federal intention (Oliveira, 2007). In the Canadian case, the cuts would have been more likely in the context prior to decentralization. In other words, decentralization created a new balance of power between the federated entities reinforcing the local citizen's interests and giving a leading role in federal policies to the municipality.

A stimulus to the decentralization movements in several countries around the world is the concentration of tax revenues at the federal level. In Brazil, this has reached 58% in comparison to 25.3% for the states and 16.7% for the municipalities. In OECD countries, there also exists tax concentration, respectively, 56,9%, 26,4% and 16,7% (Valenzuela *et al.*, 2015; CNM,2012). Despite the increased political power and social responsibility of cities around the world, the concentration of decision-making at the federal level suggests the need for further discussion on intergovernmental transfers and a new role for regional entities in national development, both in Brazil and among OECD developed countries.

Despite some operational problems, theoretical elements of federalism and policy practice recommend decentralization, as highlighted by the Washington Consensus: decentralization is good not only for the economy but also for the policy of developing democracies, to bring the government closer to the people, to expand the supply of services and to create "accountability" systems (Stepan, 1999). Financial agencies, such as the World Bank, the International Monetary Fund, and the Inter-American Development Bank, constitute important vehicles of global scale dissemination on decentralization (Melo, 1996), presented the following data: in 1980, sub-national governments, including cities government, were responsible for 15% of revenues on average, and 20% of total government spending. In the late 1990s, these figures had risen to 19% and 25% respectively, exemplifying the decentralization progress (World Bank, 1994). By 1980, sub-national governments, including cities, in Latin America accounted for approximately 14 % of revenues and 16% of total government expenditures. By the end of the 1990s, these numbers had grown to 16% and 19%, reaching 23% and 29% in the year 2000, revealing the progress of federative decentralization (Ceneviva, 2011, p. 16). Literature and empirical data show that much of that decentralization is restricted to health and education, but there are no meaningful examples of ST & I decentralization as discussed in this paper.

In the following sections, we describe methods and explore data about initiatives regarding decentralization of ST&I, focusing on policies and actions held in two cities that are recognized for their technological parks of international expression.

4. Research method

The study offers empirical evidence of ST&I decentralization policies through the case-studies of two Brazilian cities, Porto Alegre, and São Leopoldo. These cities were selected based on their achievements in ST&I development. We considered the strong performance of Science Parks (respectively TECNOPUC and TECNOSINOS) as a characteristic of locally-lead ST&I development. Two of Brazil's most successful science parks are in these cities, according to AMPROTEC's (Brazil's Association Member of the IASP- International Association of Science Parks and Areas of Innovation).

The multiple case-study method is justified in this work because, as proposes Eisenhardt (1989), it favors to explore in detail the object of study, in this case, the city and its role in promoting ST & I. Second, because research questions seek to answer "how" and "why" (Yin, 1999).

We explored primary and secondary data related to the decentralization process from the federal to the municipal level in two Brazilian cities. The focus in this case analysis was on the federal and municipal policies that have been embedded in the cities' ST&I systems. We compared these policies and highlighted singularities that are relevant to clarify key aspects on municipal governance.

Primary data was collected in interviews with different actors of the federal and municipal ST&I policies. Interviewee selection was based on a *snowball* strategy, where a respondent (or documentary source) pointed to others to explore. We did 35 interviews and the respondents were managers of national federal agencies for ST&I funding; municipal leaders; representatives of business associations of regional and national technological based companies. Additionally, secondary data was provided by documents from the federal and municipal governments as regulatory frameworks, laws, decrees, complementary laws, normative resolutions, edicts, and official reports, among others. We also considered sources publications at the specialized ST&I press, news, and official organization's reports like those of the World Bank and UNESCO. Data was analyzed in a content-analysis approach, considering the dimensions explored in the study.

5. ST&I ecosystems: evidence from two cities

The decade of 2005-2015 represented great advancements for Brazil's public policies on ST&I, such as an innovation Law that allowed non-reimbursable funds to companies; a new policy had facilitated the use of incentives and, albeit timidly, the establishment of a first decentralized federal program for the Brazilian states (e. g. TECNOVA). Nevertheless, no federal programs on ST&I decentralization have been oriented for municipalities, despite the cities' increasing political, economic, and social relevance, especially in the formation of technology-based business ecosystems, as science parks, incubators, promotion programs to startups and so on.

Despite the lack of policies oriented specifically towards municipalities, the cases of Porto Alegre and São Leopoldo reveal that some initiatives at the municipal governmental level as well as cooperative actions integrating local government, companies, and Universities, which have favored the enhancement of the ST&I ecosystem. These two cities are in the same region at Southern Brazil but are different in respect to size, constituencies, cultural background, economic bases, etc. Their similarity is in their well-ranked position on the Human Development Index. In 2013, Porto Alegre was rated with 0,805 (very high) and São Leopoldo with 0,799 (high), positioning these cities in the highest ranked positions in the country. Both cities are well served also by higher education institutions and have science parks located within their boundaries.

Another important similarity is the challenge both cities have been facing in respect to their economic bases. São Leopoldo's economy has been based on small machinery companies connected to various traditional industries like footwear and furniture. The decline in competitiveness of these industries mobilized different city stakeholders to create a science park on the campus of the main community University in that area (UNISINOS University). Porto Alegre, as the state capital, needs to improve its economic matrix with dynamic industries. Consequently, stakeholders in Porto Alegre's ecosystem, as in São Leopoldo, have been challenged to create new strategies based on technology to promote city development.

In the connection with federal policies to support ST&I, both cities are in line with federal policies because: a) They support private companies through non-reimbursable financing; and b) They practice the direct tax exemption incentive. Both municipalities have demonstrated positive outcomes from their incentive policies to enhance digital ecosystems as shown by the increase of companies and projects at the Science Parks and at their extensions. However, there are differences to highlight when one makes a horizontal comparison between the municipal policies in these two cases, as will be discussed below.

Management models on incentive concession: The municipalities have different management models for incentive concessions. In Porto Alegre, the incentive is permitted for any company that provides services listed in the municipal law (ITC, engineering, and architecture services). In São Leopoldo, in contrast, the company must submit in advance a project to the city hall for analysis by an expert committee.

On one hand, the prescribed policy has the advantage for companies of cutting bureaucracy, which is particularly important for small businesses such as startups, and this policy facilitates transparency and accountability for all stakeholders.

On the other hand, the incentive based on project analysis, as proposed in the São Leopoldo policy, reinforces relationships among the municipality and the benefited companies. This policy also enables the municipal government to better stimulate the development of industry segments and technologies that it considers a priority. This is more difficult when the benefit is granted based on a preconceived policy that has only prescribed in a generic approach the segment or industry to be stimulated.

Coincidentally, a report from GCEE (2008) states: "it is the projects that more directly reflect the priorities of the policy".

I*ncentive value and counterpart*: São Leopoldo permits only a calculation-based increase, while in Porto Alegre the incentive is calculated on the entire base, which can mean different values and greater simplicity for companies and for municipality supervision. In contrast, the incentive on revenue increase has the merit of facilitating company growth.

In São Leopoldo, the best incentive levels depend on the counterpart in the form of increased revenue or an increase in the number of employees or subcontracting of one or more of the city's companies, according to a formula established by law. In Porto Alegre, there is no counterpart requirement to the company that receives the benefit, instead the fulfillment of global targets by the benefited economic sector is required. Negotiation took place with the representative entities of the sector when the law was approved. For computer services, the reference is the sector's average tax collection for the three previous years (2001, 2002, 2003), which is compared with the average of the subsequent fiscal years to the incentive grant (since 2004). For the engineering sector's grant, the comparison base was the 2007 tax collection.

Supervision and Covered sectors: In Porto Alegre, all participating companies receive an incentive to reduce the Service Tax (ISS) rate at 60% with a reduction between 2 and 5%. In São Leopoldo, this reduction tax depends on a formula, which rewards the increase in the number of employees, a billing increase, and/or the increase of the volume of local subcontracting. Complex controls lead to differences in interpretation that may cause problems for the beneficiary companies and complicate municipal supervision.

São Leopoldo's tax incentive is broader and benefits companies from various sectors. In Porto Alegre the incentive is limited to specific computer, engineering, and architecture services, previously defined by the law, which represents a limitation as when changing laws in response to the dynamics of technology-based activities, the municipality does not necessarily respond in a timely manner.

Concession period: In São Leopoldo, the incentive period is of thirty months; in Porto Alegre, indefinitely. This does not mean that the period is truly unlimited because, strictly speaking, the municipality may unilaterally halt the incentive at any time.

In short, determining the best incentive program is beyond the scope of this article, but it is necessary to point out differences and similarities because both municipalities have successful public policies, as evidenced by their technological parks and other indicators. The differences between the two municipalities suggest considerations of the trajectory dependency, in the sense that the previous choices determine different trajectories even in similar environmental conditions. In complex systems, there is no one single best answer. Table 1 summarizes main empirical findings.

Tab. 1: Policies and the role of cities at the ST&I system

	Case: PORTO ALEGRE	Case: SÃO LEOPOLDO
Management models on incentive concession.	"Automatic" incentive: Incentive is permitted for any company that provides services listed in the municipal law (ITC, engineering, and architecture services).	"Non-automatic" incentive: Companies need to apply for incentives, Applications are analyzed by a council which represents the city governance.
Incentive value and counterpart.	Tax reduction: The company has reduction on tax calculation.	Tax reduction + more incentives: The company has reduction on tax calculation and can get more incentives but should apply for the city council analysis.
Supervision and covered sectors.	Limited to specific computer, engineering, and architecture services, previously defined by the law.	Benefits companies from various sectors.
Concession period.	The incentive period is "undefined".	The incentive period is of thirty months.

Source: Compiled by the authors.

6. Final considerations

This article queried on role of cities in national ST & I policies and how should it be structured to promote technology-based business ecosystems. Aligned with extant studies on the knowledge economy and relevance of cities, we emphasized the importance of the involvement of governments around the world to support the ST&I, the growing importance of the role of cities for regional economies and the strategic importance of federal decentralization for a sustained national development.

Based on the evidence presented here, this proposal of decentralization of federal ST&I policy, via municipalities, has as its outset the finding that cities have the potential to enhance and complement the performance capacity of the federal government. The research shows that municipalities are better prepared than the federal government to identify and select relevant local projects, identifying emerging start-ups with potential and for enhancing local tech-based ecosystems.

Research has shown that despite the relevance of federal government agencies and the work done in promoting ST&I for decades in Brazil (agencies like FINEP, CNPq, CAPES), they appear to have limited bargaining power in budget resource disputes in relation to other federal agencies, to which they are subordinate. Thus, the city's inclusion brings a new political force to the national innovation system, especially when acting collectively. This new balance of power can intervene in some key aspects of intergovernmental relationship, such as: an increase in the national system's *efficiency*, thanks to the operational reach of the municipal authority; the reduction of budget *instability* of public development policies that tend to fluctuate due to several factors; the increase in *reciprocity* of intergovernmental cooperation and the decrease of asymmetry in power,

mainly due to the excessive resources concentrated at the federal entity. A harmonious and balanced relationship promises to achieve mutual benefits, common interests and goals that would otherwise be unfeasible to any of the parties singularly.

Empirical evidence shows that: (a) governmental promotion of ST&I public policy remains crucial to the development of technology-based business ecosystems; (b) the studied municipalities show the capability to mobilize resources, structure incentive mechanisms, articulate actors and organize governance systems; (c) decentralization via municipalities tends to improve capillarity and effectiveness by strengthening regional innovation systems and complementing national ST&I policies; (d) municipalities have the economic and political power to influence the political environment and make adjustments in national ST&I policies, as shown by some recent events.

Observed differences in empirical data from development policies between the two municipalities show the need for flexibility in the adaptation of decentralized national policies to the specificity of different local realities, in accordance with the CGEE (2010). The studied municipalities have trajectories, legal frameworks, institutional arrangements, and different systems of governance, with few points of contact. However, both have in common the fact that they are successful in their municipal development policies in ST&I.

From a theoretical point of view, this article contributes to studies on federative decentralization by discussing the role of cities in policies for ST & I, a complex, dynamic, and strategic subject for the nations worldwide and aims to fulfill a gap on extant literature about smart cities. As managerial implications, this study suggests policies that can be adopted to provide better structure to cities on the development of tech-based ecosystems, as management models on incentive, incentive value and counterpart, supervision and covered sectors and concession period.

As a limitation, we highlight that this study requires further empirical validation and analysis of evidence of other initiatives of ST&I decentralization. We suggest to further studies to consider transdisciplinary approaches, such as the composition of political science with organizational studies to have a more complete approach of multilevel and multidimensional aspects at ST&I systems.

As a final remark, we remind that often cities are the source of nations' major problems such as violence, pollution, water supply, energy, sewage treatment and garbage collection among many others. Paradoxically, they also account for the solution to these major national problems, once they are the center of new technology development and the concentration in critical mass of talents and the raw material of knowledge economy. Therefore, there is room to structure them in order that they are effective protagonists in national public policies of ST&I, energizing their economic matrix and increasing their ability to generate income, jobs, and new entrepreneurial opportunities.

References

AMDAM J. (2003), "Structure and strategy for regional learning and innovation: challenges for regional planning", *European Planning Studies*, vol. 11, n. 4, pp. 439-459.

ARRETCHE M. (2004), "Federalismo e políticas sociais no Brasil: problemas de coordenação e autonomia", *São Paulo em Perspectiva,* vol. 18, n. 2, pp. 17-26.

BANTING K. (2004), *Canada - Nation-building in a Federal Welfare State Zentrum für Sozialpolitik*, Universität Bremen, Bremen.

BECKMANN M.J., THISSE J.F. (1987), "The location of production activities", in Nijkamp P., *Handbook of Regional and Urban Economics*, vol. 1, pp. 21-95.

BLOOMBERG M.R. (2011), "Mayors voices: C40 Chair New York City Mayor Michael R. Bloomberg. New York", *C40Cities, available at:* http://www.c40.org/c40blog/mayors-voices-c40-chair-new-york-city-mayor-michael-r-bloomberg (accessed 10 December 2013).

CASTELLS M. (1999), *A Sociedade em Rede*, Paz e Terra, São Paulo.

CARAGLIU A., BO C., NIJKAMP P. (2009), "Smart Cities in Europe Smart Cities in Europe", *3rd Central European Conference in Regional Science - CERS*, vol. 732, pp. 45-59.

CENEVIVA R. (2010), *O Nível de Governo Importa para a Qualidade da Política Pública? A Municipalização da Educação Fundamental no Brasil*, USP - Universidade de São Paulo. Faculdade de Filosofia e Ciências Humanas, São Paulo.

CENTRO DE GESTÃO E ESTUDOS ESTRATÉGICOS (CGEE), (2010), "Descentralização do fomento à ciência, tecnologia e inovação no Brasil", *Centro de Gestão e Estudos Estratégicos*, ISBN 978-85-60755-28-8, Brasília, DF, available at: www.cgee.org.br (accessed 15 August, 2015).

CONFEDERAÇÃO NACIONAL DOS MUNICÍPIOS (CNM), (2012), "Estudos fiscais: estimativas da participação dos entes da federação no bolo tributário", *Estudos Técnicos CNM*, vol. 1, n. 8, pp. 77-81.

DIRKS S., KEELING M. (2009), *A Vision of Smarter Cities: How Cities Can Lead the Way into a Prosperous and Sustainable Future*, IBM Institute for Business Value, New York.

DUCHACEK I. (1970), *Comparative federalism: the territorial dimension of politics*, Holt, Rinehartand Winston, New York.

FLORIDA R. (2008), *Who's your City? How the Creative Economy Is Making Where You Live the Most Important Decision of Your Life*, Basic Books, New York.

FU S. (2007), "Smart café cities: testing human capital externalities in the Boston metropolitan area", *Journal of Urban Economics,* vol. 61, n. 1, pp. 87-111.

HAYEK F.A. (1945), "The use of knowledge in society", *The American Economic Review*, vol. 35, n. 4, pp. 519-530.

MAZZUCATO M. (2011), *The Entrepreneurial State*, Demos, London.

MELO M.A. (1996), "Crise federativa, guerra fiscal e 'hobbesianismo municipal': efeitos perversos da descentralização?", *São Paulo em Perspectiva*, vol. 10, n. 3.

MONASTERIO L. (2011), "Fundamentos do pensamento econômico regional", *Economia regional e urbana: teorias e métodos com ênfase no Brasil,* IPEA - Instituto de Pesquisa Econômica Aplicada, Brasília, pp. 43.

MYRDAL G. (1957), *Teoria econômica e regiões subdesenvolvidas,* Ministério da Educação e Cultura, Rio de Janeiro, Original edition.

OATES WALLACE E. (1999), "An Essay on Fiscal Federalism", *Journal of Economic Literature*, vol. 37, n. 3, pp. 1120-1149.

OLIVEIRA V.E. (2007), *O municipalismo brasileiro e a provisão local de sociais: o caso dos serviços de saúde nos municípios paulistas,* 237 f. Tese (Doctorate) - Departamento de Ciência Política, Universidade de São Paulo, São Paulo.

PAIVA C.A. (2004), *Como Identificar e Mobilizar o Potencial de Desenvolvimento Endógeno de uma Região*, FEE - Fundação de Economia e Estatística, Porto Alegre, RS.

PERROUX F. (1982), *Dialogue des Monopoles et des Nations. Presses Universitaires de Grenoble,* Grenoble, (original edition 1955).

SAMBAMURTHY V. , BHARADVAJ, A., GROVER, V. (2003), "Shaping agility through digital options: reconceptualizing the role of information technology in contemporary firms", *MIS Quarterly Management Information Systems Research Center*, University of Minnesota, USA. vol. 27, n. 2, pp. 237-263.

SANDULLI F., FERRARIS A., BRESCIANI S. (2016), "How to select the right public partner in Smart City projects", *R&D Management*, vol. 47, n.4, pp. 607-619.

SASSEN S. (1999), *The Global City. New York, London, Tokyo*, eBook Princeton University Press, USA. ISBN: 9781400847488.

SASSEN S. (2009), "Cities Today: A new frontier for major developments", in *The Annals of the American Academy of Political and Social Science*, vol. 626, n.1, pp. 53-71.

SCRIMGER K., JUBI H. (2000), "Lyon, France: Webb opens first Transatlantic Summit of Mayors", *U.S. Newspaper*, New York, vol. 67, n. 7, available at: http://www.usmayors.org/usmayornewspaper/documents/04_17_00/Lyon_front_pg.htm (accessed 5 December 2013).

STEPAN A. (1999), "Para uma nova análise comparativa do federalismo e da democracia: federações que restringem ou ampliam o poder do demos", *Dados* [online], vol. 42, n. 2, pp. 197-251.

TECNOVA (2010), *Manual Operacional e de Orientação ao Parceiro*, FINEP. RJ, available at: http://download.finep.gov.br/noticias/ManualdeOrientacaoaosParceiros programaTECNOVA.pdf (accessed in 2016).

TIEBOUT C.M. (1956), "A pure theory of local expenditures", T*he Journal of Political Economy*, vol. 64, n. 5, pp. 416-424.

TREGUA M., AMITRANO C.C., BIFULCO F. (2015), "Cultural heritage and multi-actors innovation. Evidences from smart cities", *XXVII Convegno annuale di Sinergie: Heritage, management e Impresa: Quali Sinergie?*, pp. 859-872.

UNITED NATIONS EDUCATIONAL SCIENTIFIC AND CULTURAL ORGANIZATION (UNESCO), (2010), *Relatório Unesco Sobre Ciência 2010: O Atual Status da Ciência em Torno do Mundo*, Representação da UNESCO no Brasil, Susan Schneegans (ed.), Brasília.

UNITED NATIONS (2008), *World Population Prospects: The 2008 Revision*, New York.

VALENZUELA E., PRESSACCO F., CIENFUEGOS I., PENAGLIA F. (2015), "Pilares necesarios para una descentralización autónoma sin cooptación del poder central: reflexiones para el proceso descentralizador chileno", *Revista de Administração Pública, Fundação Getúlio Vargas*, vol. 49, n. 5, pp. 1083-1106.

YIN R. (1999), *Case study research,* Sage, Thousand Oaks (CA).

WEISS M.A. (2006), "Metropolitan economic strategy: the key to prosperity", *Harvard College Economics Review*, Fall, pp. 25-27.

WORLD BANK (1994), *World Development Report 1994: Infrastructure for Development, Technical report,* Oxford University Press. New York, NY.

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