

Pessoa, Argentino

## Conference Paper

# Regional cluster policy: key features and critical issues

52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia

### Provided in Cooperation with:

European Regional Science Association (ERSA)

*Suggested Citation:* Pessoa, Argentino (2012) : Regional cluster policy: key features and critical issues, 52nd Congress of the European Regional Science Association: "Regions in Motion - Breaking the Path", 21-25 August 2012, Bratislava, Slovakia, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

<https://hdl.handle.net/10419/120509>

### Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

### Terms of use:

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# Regional cluster policy: key features and critical issues

**Argentino Pessoa**

CEF.UP, Faculdade de Economia, Universidade do Porto

Rua Dr. Roberto Frias

4200-464 Porto, Portugal

Email: [apessoa@fep.up.pt](mailto:apessoa@fep.up.pt)

## Abstract

Nowadays, policy makers in charge of designing innovation policies, especially at the regional level, are more and more adopting the cluster approach either with a view to accelerate the *existing* clusters or for providing the basis for the emergence of *new* ones. In fact, not only as a consequence of their appeal as an interactive and territorially embedded vision of innovation but also owing to a lot of other reasons, clusters are usually considered as key instruments for promoting competitiveness, industrial development, innovation and growth.

But, although cluster policies have a potential for generating benefits, the presence of potential benefits from cluster initiatives is not per se a sufficient foundation or a validation for policymakers to get involved, since clustering is something that has been happening spontaneously during time. The key question is whether and how policymakers can add value through appropriate measures, beyond the outcomes that markets and market players produce on their own.

While there is an extensive literature that focuses on the cluster analysis, the connection between clusters and policy has been mainly ignored. This paper tries to shed light on this issue, highlighting the key features of both the cluster concept and policy. It also aims at contributing to diminish the existing gap between theory and policy comparing two broad models of cluster policy: the Asian and the OECD approach.

Keywords: agglomeration, clusters, cluster policy, innovation, competitiveness, externalities, regional economic development.

JEL classifications: L25; L26; R11; R58.

## 1. Introduction

There has been an increasing rhetoric about creating and supporting local industrial clusters. The immediate reason is because political leaders and development agencies generally assume that industrial clusters play a key role in regional development (Brachert et al, 2011), not only by boosting innovation (OECD, 1999) but also by acting as drivers of competitiveness (Lagendijk, 1999, Morgan and Nauwelærs, 1999, Storper, 1995) and usually empirical studies do not contradict these theses (Enright 1996; Isaksen 1997; Cooke 2001; Rosenthal and Strange, 2004; Spencer et al. 2009)<sup>1</sup>. Moreover, research in economic geography and regional science has empirically shown that agglomeration has been positively associated with productivity at the local level both in the US and in Europe (e.g., Ciccone and Hall, 1998; Ciccone, 2002). So, it is not surprising that building clusters has quickly changed from a ‘fad’ to a ‘guiding principle’ of economic development policy (Raines, 2002).

Although the study and discussion of industrial agglomeration has a long history in academic community discussions, it was the Porter’s competitiveness concept that put it in the front page. In fact, it was only after Michael Porter (1990) has examined the industrial agglomeration from the firm perspective that the theme surpassed the restricted circles of economists and geographers. Porter’s consultant work, alone or in association with his Monitor Company, has contributed to the wide diffusion of cluster strategies in many countries (Benneworth *et al.*, 2003; Rosenfeld, 2005).

But the Porter’s approach to industrial agglomerations helped not only to impose a concept and to justify clusters as targets for public policy, but also it has created a global demand for consultants with policies to fit it, and this has had a cumulative effect on the popularity of clusters. As Rosenfeld (2005: 4) has noted, this increasing demand of consultants can explain, almost partly, why industry clusters have moved from a “relatively obscure idea situated on the periphery of economic development to a core practice”.

Since the image of high productivity, prosperity, decentralization and entrepreneurship associated to the cluster brand has helped to promote the idea that a socially progressive local economy can be achieved by policy makers wherever regions

---

<sup>1</sup> Of course, there are exceptions (e.g., Perry, 2010a).

are located and whatever instruments are used, some authors consider cluster policy popularity more as a result of the use of techniques of 'brand management' than as a genuine intellectual discourse (Martin and Sunley, 2003, Perry, 2010b).

Some other criticisms are directed to both the Porter-inspired cluster developments that gave policy professionals a rationalization for local intervention and to the proposed universal policy therapy that assures sustained growth to any locality or region (Perry, 2010b). Policy makers in many countries and regions view these developments as advice to combine cluster support with any type of intervention, from simply recognizing the presence of a cluster to the complete promotion of entirely new clusters.

But there are many other criticisms: first, because in designing policy programmes, policy-makers often do not take into account some basic aspects of a cluster policy, applying the same measures to all supported local clusters within a programme (Brenner and Schlump, 2011). Second, the scientific literature rarely provides recommendations on how to select adequate policy measures in order to support clusters. In fact, while there does exist an extensive literature that deals with the cluster analysis, the connection between this analysis and policy has been mainly ignored (Lorenzen, 2001).

In face of the controversy about the cluster policy and from a regional policy standpoint two questions are mandatory: first, can policy be effective in making appear new clusters? Second, assuming its effectiveness, what is the appropriate policy for enforcing the clustering development and by that means promoting regional economic growth?

The answer to the first question depends on the characteristics of clusters and on the effectiveness of policy instruments to replicate such characteristics. Respecting to the second question, there is not a consensual answer, as stated elsewhere (Pessoa, 2011). The debate is polarized around two extreme positions: on the one hand, the classical optimal-policy perspective (Rodríguez-Clare, 2007) and on the other the Porter's policy prescriptions<sup>2</sup>. These extreme positions have a counterpart in two different regional patterns: the Asian model and the OECD model.

---

<sup>2</sup> These prescriptions are synthesized in Woodward and Guimaraes (2009): i) support the development of all clusters, not choose among them; ii) reinforce established and promising clusters rather than attempt to create entirely new ones; iii) cluster initiatives are advanced by the private sector, with government as facilitator; iv) development should not be guided by top-down policy strategies.

Accordingly, the remainder of this paper is organized as follows. After reflecting on the concept of cluster and on its key features in section 2, section 3 deals with the difficulties in translating the key features highlighted by cluster analyses in policy principles and instruments. Next, section 4 calls attention to the need of making cluster policy suitable for the (actual or desirable) regional context. Section 5 presents two broad models of cluster policy, contrasting the OECD approach with the Asian one. Finally, section 6 concludes.

## **2. Clusters: key characteristics**

Since the 1990s, Michael Porter's work about 'clusters' has increasingly established the standard in the field, and accordingly Porter's cluster model has been used all over the world as a tool for promoting national, regional, and local competitiveness, innovation and growth. In fact, very quickly clusters called the attention of many leaders in many regions, and consequently the cluster related concepts were extended promptly to go with local circumstances and expectations. However, at least a large part of the popularity of clusters lies in its vagueness and definitional elusiveness (Martin and Sunley, 2003) and it is likely that it would be this ambiguity that allows both to apply the cluster concept to different realities and to prevent an accurate policy evaluation. Furthermore the tendency to oversimplify, which is associated to the vulgarisation of the definition of "cluster", permits to find clusters everywhere. In effect, both individual researchers and development agencies have identified in recent years clusters so diverse as ranging in size from two to thousands companies, enveloping territories as small as a neighbourhood and as large as nations, and comprising highly specialized members as defined by a four digit industry code and as broadly defined as "high tech". In today's policy world, clusters are acquiring "the discreet charm of obscure objects of desire" as, citing Steiner (1998, p. 1), Martin and Sunley (2003) have reminded.

So, there is a lot of confusion around the cluster concept. A key characteristic of clusters is the interdependence among firms. This interdependence gives clustered firms certain advantages over isolated firms. But is this interdependence a sufficient condition

for classifying any association of firms (for instance, a network) as a cluster? In our view the answer is negative.

In fact, there are other groups of firms characterized by interdependence (*i.e.*, firms are dependent on assets controlled by other partners). For instance, both clusters and networks are characterised by independence and interdependence at the same time. But, there are significant differences between clusters and networks (Rosenfeld, 2005). According to Ceglie *et al* (1999: 270) “the term *network* refers to a group of firms that co-operate on a joint development project – complementing each other and specialising in order to overcome common problems, achieve collective efficiency and conquer markets beyond their individual reach”. On the other hand the term *cluster* is used to indicate a “sectoral and geographical concentration of enterprises which, first, gives rise to external economies (such as the emergence of specialised suppliers of raw materials and components or the growth of a pool of sector specific skills) and, second, favours the rise of specialised services in technical, administrative and financial matters. Such specialised services create an encouraging ground for the development of a network of public and private local institutions which support local economic development by promoting collective learning and innovation through implicit and explicit co-ordination” (Ceglie *et al*, 1999: 270).

Table 1. Some differences between clusters and networks

	Clusters	Networks and firms' associations
Free-riders	Yes	No
Membership	No	Yes
Formality	Informal	Formal
Access	Inclusive	Exclusive

Table 1 presents the most important differences between clusters and other forms of firms' associations. Both networks and clusters are agglomerations of firms with certain common interests. According to Porter (1998, p. 78) “clusters are geographic concentrations of interconnected companies and institutions in a particular field”. But, contrasting with networks, neither “membership” in an organisation nor cooperation is required to be “in” a cluster. Free riders, just by virtue of location, are able to benefit from non-exclusive external economies that spill over people and organizations

localized under the cluster influence. Clusters are informal and inclusive while networks are formal and exclusive, with members gaining advantages over non-members (Rosenfeld, 2005). In clusters, free riders are not only unavoidable but also, and perhaps more importantly, contribute to make cluster more powerful.

Another recognized feature of the industry cluster concept is the proximity between businesses, which improves the exchange of knowledge and technologies. The benefits of proximity are well-known: Proximity makes greater access to tacit knowledge possible, opens opportunities for cooperation and collaboration and gives the clustered firms power to influence customers, markets, or policies. Proximity also gives higher access to experienced labour and allows firms to be more familiarized with competitors' products and processes and to check own innovation and targets. In spite of the influence of recent innovations, as Internet and overnight delivery, proximity go on being helpful for mapping the growth of territorial innovation systems (Morgan, 2004) and even crucial for some production inputs as key equipment and components that are knowledge-intensive and/or result from interactive research and design (Rosenfeld, 2005).

But the importance of proximity in the transfer of tacit knowledge does not depend solely on geographical distance, as traditional explanations of the time and cost advantages of co-location tend to conclude. Although geographic co-location increases the probability of interaction does occur, proximity has also a *relational* dimension (Boschma, 2005). This is important to keep in mind since the exchange of strategically important information and knowledge requires mutual trust between the parties. In this sense, proximity is very related with the social capital concept highlighted by Putnam (1993) when he analyses the Italian economy.

So, the proximity that is the key characteristic of a region possesses not only a spatial (geographical) dimension, but also a *relational* dimension. This involves aspects such as trust and understanding (Boschma, 2005). Although much of the literature agrees that spatial proximity often generates, or at least encourages, the emergence of relational proximity, this is neither an automatic nor an instantaneous result from geographic proximity, because trust between the actors is basically an effect of how long a particular relationship lasts, how frequent communication between the actors is, and whether they engage in repeated collaborations with the same actors (Nilsson,

2008). So, despite how close two actors are in terms of geographical location, a lack of trust between them can lead to the failure of wished interaction and knowledge exchange.

In the case of the tacit dimension of knowledge, labour mobility between organisations is probably one of the most common channels for knowledge transfer between organisations in a region. Labour mobility also has a clear territorial dimension since the mobility of individuals between regions, and even more so between countries, is very limited. However, the experience of human resources has remained a primary reason of clustering (Krugman, 1991). Firms depend on a continuous flow of workers skilled with the necessary ability, and with the knowledge of the business, which are needed to both routine and unforeseen situations. In every cluster not only a sufficient provision of technicians, sales staff, network organization, but also a labour force experienced on the specific milieu in which the cluster functions are crucial. This is very hard to get when policy tries to create an entirely new cluster.

On the other hand, the evidence suggests spontaneity in clusters emergence. As shown by Rosenfeld (2005: 9), clusters emerge out of a solid foundation that is either embedded in existing companies, local expertise, or some special resources. The world's best-known clusters have a long history and were spontaneous until they reached a sufficient level of activity. This suggests some sample bias in analyses of cluster benefits: usually, only the clusters that call attention are studied and many potential clusters disappear before they constitute case studies. Perhaps this fact can explain some controversy about the positive effects of clusters. In fact, if some researchers as Baptista and Swann (1998) conclude that innovation, entry and growth tend to be stronger in clusters and that firms located in strong clusters are more likely to innovate, others (*e.g.*, Perry, 2010a) state that, in practice, there is no strong evidence that the businesses located in a cluster gain an advantage over those that do not.

To sum up, economic history shows that the origins of clusters are diverse and wide-ranging: we find clusters that result from one or two successful companies with employees with an entrepreneurial vision; or from the expansion of value added chains around very large firms; or even from efforts by laid off employees to use their competencies in innovative ways. But, although their origin may be varied, spontaneity, *relational* dimension of proximity, tacit knowledge, interdependence and some



informality are key characteristics of all of the best-known. All of these characteristics are hardly created or manipulated by policy. So a policy that has as the main aim the creation of clusters is of difficult concretisation.

### **3. The difficult bridge: from theory to policy**

As noted in the Introduction, the idea of clusters and cluster policy became popular in the policy debate following the publication of Porter's analyses about competitiveness at the dawn of the 1990s. But, contrasting with such popularity, the resulting policy inferences are much more controversial. Although Porter's definition of clusters as "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (e.g. universities, standards agencies, trade associations) in a particular field that compete but also cooperate" (Porter, 2000 p. 15) has become one of the most widely used in the cluster rhetoric, the consensus ends when policy needs an operative definition. Apart from the idea that the presence of a cluster requires the analysis of the performance of a given industry to be made in close relation with the performance of related sectors and institutions, there are many ambiguities surrounding the cluster concept, and its relationship with regional economic performance is poorly studied.

Indeed, there is no consensual definition of cluster from a policy point of view. Some consider "The cluster concept as, in fact, a specific type of a much larger family of "systems of innovation" approaches, or as reduced-scale national innovation systems (Roelandt and Hertog, 1999). The common starting-point of this perspective is "the assumption that, in order to innovate successfully, firms need a network of suppliers, customers and knowledge-producing agents" (Roelandt and Hertog, 1999: 414). In practice, the concept of cluster used in different countries is so diverse as either Innovation systems (Canada, Mexico, Spain) or regional systems of innovation (UK), networks of production, networks of innovation etc. (Australia, Belgium, Switzerland); value chains and networks (USA), value chains and networks of production (Netherlands, Norway); industrial districts (Austria).

Of course there is a large literature about clusters (Asheim and Isaksen, 1997; Feser, 1998a, 1998b; Harrison, 1992; Heidenreich, 1996; Isaksen, 1997; Jacobs and de Man, 1996; Kaufman *et al.*, 1994; Park and Markusen, 1995; Steiner, 1998), and from the work of these,

and many other authors, have resulted a refined analysis. However, many problems came across in translating the sophisticated and commonly understood analysis into effective policy.

First, there are some misunderstandings about how to consider cluster policy. While some policy makers consider cluster policy as a specific policy instrument, other analysts view clusters as only an opportunity to apply a different guiding principle. In the latter interpretation the cluster policy consists of a better comprehension of the dynamic potential for growth of an industrial agglomeration. Cluster analysis means taking a closer look at complementarities within given or potential economic structures. It helps to define priorities in regional development programmes and to fine-tune the supply of public research and educational institutions (Peneder, 1999: 354).

Second, while the studies on clusters state that they may generate knowledge spillovers and enhanced innovation (Camagni, 1991; Cooke, 2002; Maskell and Malmberg, 1999; Porter, 1998), the channels of knowledge transmission either remain unclear (Tödting *et al.*, 2009) or are described as multiple and varied. In the latter case, the channels may be patents or scientific articles (Jaffe *et al.*, 1993), observation and imitation of competitors (Malmberg and Maskell, 2002), and development of spin-offs or the relocating of qualified labour (Keeble and Wilkinson, 2000).

Also many analyses emphasize different sources of knowledge spillovers. For instance, in studying the US semiconductor industry, Ketelhöhn (2006) classified the sources of spillovers in four main categories: buyers (Morris, 1990; Smith, 2000; Leslie, 2000), suppliers and related industries (Morris, 1990, Macher *et al.*, 1998), competitors (Braun and McDonald, 1978), and academic institutions (Braun and McDonald, 1978; Morris, 1990; Saxenian, 1994).

Other authors explain dynamic externalities as resulting from processes of localised learning (Maskell *et al.*, 1998; Maskell and Malmberg, 1999; Malmberg and Maskell, 2006). This means that learning appears as the key way of transmitting knowledge in territorially industrial agglomerations and, consequently, to know how and under what principles knowledge can be transmitted is decisive for designing and implementing an effective regional policy.

In regional innovation research the tacit dimension of knowledge is usually emphasized as it allows explaining how firms can benefit from regional co-location (Gertler, 2003). One advantage of clusters is the idea that the proximity between businesses improves the exchange of knowledge and technologies. In fact, proximity and face-to-face

contacts are very important in transmitting tacit knowledge. Where the proximity is high it is likely that the tacit knowledge spills over to neighbours. Furthermore, proximity increases the strength of linkages between people and organizations<sup>3</sup> and is fundamental for localized learning.

The localized learning can occur between many entities and through multiple processes, such as learning by doing, learning by using, learning by interacting. It involves three facets: horizontal, vertical and multi-level learning. The horizontal learning is performed between firms mostly belonging to the same industry and providing similar goods and services. At this level, the relationship between firms is a composite of competition and cooperation, for short, cooptation. While the competition focus on the common raw material, labour force and goods market, the cooperation focuses on the creation of a common market, the establishment and maintenance of a common brand and so on. As the similar producing conditions and the existence of a “common language” benefit the communication and knowledge transfer, the learning process consists of comparing, observing and imitating each other. Proximity offers the firms the possibility of conveniently and freely observing and evaluating the innovation activities of others, which reduce the cognitive distance and enhance the absorptive capability of clustering firms.

Vertical learning refers to forward and backward interactions of firms located in different points of the value chain, i.e., the learning between providers and consumers and the learning between producers and suppliers. By keeping a close contact with users, clustering firms can acquire timely market information (Malmberg and Power 2005). Especially, the sophisticated buyers usually ask for the superior quality and high reliable production, which contribute to design and upgrade production. On the other hand, the backward learning helps firms to acquire complementary technology to upgrade their design and to profit from the effects of their provider’s R&D. In clusters, owing to long-term cooperation and high trust, the clients and the suppliers are able to communicate each other widely and freely, which facilitates the exchange of open information and helps to solve common problems.

---

<sup>3</sup> These are some reasons why one can consider the “death of geography” thesis as “exaggerated” (Morgan, 2004), although proximity must not only be considered in terms of geographical distance (Boschma, 2005).

Multi-level learning refers to the interactive learning between firms and other local actors, such as the local governments, universities, public research institutes and other organizations. These organizations provide local firms with all kind of services and infrastructure, which promote knowledge-sharing and cooperation. Especially as for the knowledge and technology infrastructure, university and public research institutes not only perform a role in education, training and technology transfer but also create new ideas, knowledge and technology.

In sum, although the cluster analysis can present a huge amount of mechanisms that explain how clusters are associated to competitiveness and innovation, these features have been more fully exploited in economic analyses than in the design of policies (Bergman and Feser, 1999). Given the multiplicity of channels and sources of positive externalities, it is understandable the non-existence of a single, predefined path to be followed in the implementation of cluster promotion initiatives (Ceglie *et al.*, 1999: 286). In such circumstances it is practically impossible to design a policy with precise objectives and instruments. However, if the sources of positive externalities are so evident and abundant, market fails in providing efficient allocation of resources and, consequently, policy has a role to play in efficiency and growth grounds.

#### **4. Cluster policy and regional context**

An important characteristic of the Innovation System approach is the mutual embeddedness between institutions and organizations that is, firms and other organizations are strongly influenced and shaped by institutions. Organizations can be said to be ‘embedded’ in an institutional environment or set of rules, which include the legal system, norms, standards, etc. But institutions are also ‘embedded’ in organizations. Hence, there is a complex two-way relationship of mutual embeddedness between institutions and organizations, and this relationship influences innovation processes and thereby also both the performance and change of systems of innovation. (Edquist and Johnson, 1997). The institutions shape (and are shaped by) the actions of the organizations, and so cluster support initiatives need to be flexible and in tune with the characteristics of the environment where firms operate.

However, the cluster policy forces the answer to another fundamental question: Is the cluster policy aimed at improving the current characteristics of the regional innovation system

or, on the contrary, at transforming the type of prevalent RIS? But this also implies that clusters should be thought of embedded in the territory and so it is necessary to know which type of industrial agglomeration should be developed or in which type of Regional Innovation System the cluster policy should be inserted.

#### **a) Industrial districts**

Markusen (1996) identified four distinct types of industrial agglomerations that differ by industry dynamic, corporate priorities, government involvement, financing, and employment structure: a) Marshallian-Italianate industrial district; b) Hub-and-spoke district; c) satellite platform district and d) State-anchored industrial district.

According to Markusen (1996) a skilled, flexible labor force that is committed to the region and deep networks defines Marshallian-Italianate districts. These characteristics allow Marshallian-Italianate regions to identify and support emerging industries, and to respond quickly to economic and technology shifts. These environments tend to develop in regions without a history of economic dominance from one or several leading corporations because they require effective networks, which established companies might oppose. For instance the Marshallian-Italianate features apparent in the Shanghai region help to explain the emergence of high-tech clusters in proxy Chinese cities in southern Jiangsu and northern Zhejiang provinces (Walenza-Slabe, 2012).

In Hub-and-Spoke districts, i.e., in regions where one or a few large companies dominate the regional economy, suppliers accumulate to meet demand from the leading companies, and over time the economic activity may attract new, unrelated industries. These environments tend to be company-centric, with employees devoted to companies rather than the region as a whole. Companies tend to be highly self-sufficient and are thus generally disinterested in collaboration with other regional companies, who may be competitors. They are more likely to seek strategic partnerships with outside companies. Due to the prevalence of large vertical companies and mass markets, Walenza-Slabe (2012) sees in Beijing and Shanghai regions illustrative examples of Hub-and-Spoke regions' features.

Satellite Industrial districts are often promoted by central governments as a means of developing target regions. Local industry tends to be dominated by the subsidiaries or suppliers of outside companies, who may be domestic or foreign. Inter-company collaboration is generally weak due to the lack of effective networks. However, company

engagement in the region tends to be stable and may eventually lead the region towards a Hub-and-Spoke environment as the region gains in importance. Satellite regions face unique growth challenges due to their reliance on external financing, strategic direction and technical expertise. This type of industrial district is more likely to be associated to a policy targeted to create new clusters than to a policy for cluster development. For instance, the Chengdu region illustrates a Satellite environment due to its role as a regional hub in the government's policy of industrializing western China (Walenza-Slabe, 2012).

The business environments of State-Anchored districts are deeply influenced by government institutions and revenue and so regional economic growth is driven by government policies that allocate funding. Although the State-Anchored districts tend to be structurally similar to Hub-and-Spoke regions there is a fundamental difference: the local economy is dominated by government spending rather than by large corporations. Consequently a top-down cluster policy has more chances of being succeeded in State-Anchored districts than in other types of industrial districts. The capital city regions are frequent examples of State-Anchored economies, since the majority of large corporations locate their headquarters in the capital city by many reasons and among them with the intention of improving access to government bureaucracies (Walenza-Slabe, 2012).

## **b) Regional Innovation Systems**

Also the type of RIS (Regional Innovation System) must be taken in account in the implementation of a cluster policy. Let's illustrate with the Asheim and Gertler's (2005) taxonomy of RIS. According to this classification there are three types of RIS: territorially embedded regional innovation system, also recognized as "grassroots RIS"; regionally networked innovation system, also called "network RIS"; and regionalized national innovation system, also known as "dirigiste RIS".

The territorially embedded regional innovation system corresponds to a system where firms (mainly those employing synthetic knowledge) base their innovation activity on localized learning processes stimulated by proximity without much direct interaction with knowledge organizations. This is the case of many South European Industrial Districts, as for instance the Italian ones. In "grassroots RIS" as in Marshallian-Italianate regions (Markusen, 1996) the flexible labor force committed to the region and the

deep networks allow to identify and support emerging industries, and to respond quickly to economic and technology shifts.

On the other hand, a regionally networked innovation system is a regional agglomeration of firms surrounded by a regional supporting institutional infrastructure. It is usually the result of policy intervention to increase innovation capacity and collaboration in cooperation with local universities and R&D institutes. The basic idea is that technology transfer agencies and service centers supplement firms' competence. It is most typical of Germany, Austria, and the Nordic countries. In this RIS the policy intervention is used not only to increase collective innovation capacity but it may also be useful in counteracting technological "lock-in" within regional clusters of firms.

Finally, the regionalized national innovation system is the result of a process of clustering R&D laboratories of large firms and governmental research institutes in planned "science parks". It is a model where exogenous actors and relationships play a larger role. That is, innovation activity takes place primarily with actors outside the region (lack of local and regional embeddedness) and significant parts of the industry are more integrated into national or international innovation systems. The most notorious examples are the technopoles of France or the science parks in Japan and Taiwan. In the "dirigiste RIS" as in State-Anchored regions (Markusen, 1996), a top-down cluster policy is more likely to be succeeded than in territorially embedded regional innovation system.

## **5. Two models of cluster policy**

But, if there are several types of industrial agglomerations and policy should be designed in tune with targeted industrial districts or Regional Innovation Systems it is likely a diversity of cluster policies. Also if there is no consensual definition of cluster it is expected that in practice, countries' cluster policy approaches differ. However in spite of some differences in underling concepts there is a notable consensus in OECD countries: the preference for a *bottom-up* approach. This focuses on fostering dynamic market functioning and removing market imperfections; the foundation lies in market-induced initiatives, with the government acting as a catalyst and mediator but with no setting of national priorities (the Netherlands, the United States). When the *top-down*

approach, is used (for instance, in some Nordic countries) it has an exceptional character. In this case, government (in consultation with industry and research agencies) sets some national priorities, formulates a challenging vision for the future and decides on the actors to be involved in the conversation. But, after national priorities have been set and the dialogue groups implemented, the clustering process becomes a market-led process, with little government intervention (Roelandt and Hertog, 1999).

In our view this preference for bottom-up approach is more ideological than based in sound economic principles, reflecting the farthest position of the pendulum movement. Development policy has always been subject to fashions commanded by ideology. During the 1950s and 1960s, industrial policy, import-substitution and the “big push”, were the straight cries of policy makers both in developed and developing nations. In the 1970s these ideas were replaced with more market-friendly and outward-orientation approaches. By the late 1980s, a set of policy principles usually known as “the Washington Consensus” (Williamson, 1990) obtained a remarkable convergence of views among international institutions in charge of dealing with aid and finance problems of developing countries. In spite of many criticisms (Pessoa, 2004; Rodrik, 2003) these principles remain at the core of today’s conventional understanding of a desirable policy framework for economic growth in the Occidental World.

Also in developed world the principles of the Washington Consensus, and particularly the principles of privatisation and deregulation, paved the way of a change in development policy and consequently the 1990s have seen a shift away from “picking winners” towards “letting the market pick winners”. This change affects the design of development policies and the cluster policy is not an exception. In fact, such principles are underlining the way as cluster policy is seen in the OECD countries. Accordingly, the OECD model of cluster-based industrial policy making is based on the following prescriptions (Roelandt and Hertog, 1999: 420- 421), similar to the ones formulated by Porter:

1. The creation of clusters should not be government-driven but rather should result from market-induced and market-led initiatives.
2. Government policy should not be strongly oriented to directly subsidising industries and firms or to limiting rivalry in the marketplace.



3. Government policy should shift away from direct intervention towards indirect inducement. Public interference in the marketplace only can be justified in the presence of a clear market or systemic failure. Even if clear market and systemic imperfections exist, it cannot necessarily be concluded that government intervention will improve the situation.
4. Government should not try to take the direct lead or ownership in cluster initiatives, but should work as a catalyst and broker, bringing actors together and supplying support structures and incentives to facilitate the clustering and innovation process.
5. Cluster policy should not ignore small and emerging clusters; nor should it focus only on “classic”, existing clusters.
6. Clusters should not be created from “scratch”.

These prescriptions are all negative. They show what government should not to do. But the question is: if government is dealing with creating and supporting local industrial clusters, what is the role that government must play? According to the OECD principles above, policy should consist of creating favourable framework conditions for an efficient and dynamic functioning of markets only. But, given the extensive amount of positive externalities highlighted by many authors, cluster policy is just motivated by the market failures. And when market fails, policy must play the role that market fails to play. In fact, cluster and networks can be seen, to some extent, as public goods reducing transaction costs by internalising transactions involving external economies and so policy measures should correct market failures implied by the existence of these positive externalities. Economic theory teaches that they call for, and justify, active public policies.

In our view the Asian model is more effective in creating and supporting clusters and consequently in fostering economic growth. In the Asian model policy is based on a sequence of actions described by Akifumi Kuchiki (2005, p. 1) as the “flowchart approach”. This approach to industrial cluster policy “emphasizes the importance of the ordering of policy measures. The flow of policy implementation is to establish an industrial zone, to invite an anchor company, and to promote its related companies to invest in the industrial zone” (Kuchiki, 2005, p. 1). This approach is usually accompanied by a precise formalization of incentives and procedures intended to aid foreign business and attract FDI. The example of Shanghai is elucidative. Through the

Shanghai Foreign Investment Development Board (2011), the Shanghai municipality has formalized incentives, policies and procedures intended to aid foreign business and attract FDI. First, some Municipal administrative agencies were created and the assistance available to foreign investors was clearly defined (see table 2).

Table 2. Functions of Shanghai Municipal administrative agencies

Shanghai Municipal administrative agencies	Function
Foreign Investment Commission	Financial oversight
Development and Reform Commission	Project approval
Economic Commission	Aligning FDI with local development goals
Commission of Science and Technology	Technology partnerships and “technology for market access” deals

Source: SFIDB (2011), article 4.

Also precise conditions for investment and incentives are typified in Shanghai Foreign Investment Development Board (SFIDB, 2011), for instance: a) incentives are only available for investments of more than \$2 million in foreign capital and if 80% of enterprise staff is full-time professional research and development personnel (Article 5); b) exemptions from customs duties and value added taxes on imports for approved companies (Article 6); c) up to 50% deduction of taxable income for approved companies (Article 7); d) land grants and subsidized rent for approved R&D facilities (Article 8). By clarifying the incentives available to foreign investors and the constraints under which they must operate, Shanghai and other large cities have been succeeded in attracting capital and new business by reducing the uncertainty of operating in a foreign country so singular as China.

But the sequence of actions is accompanied by the creation of “sufficient conditions” for the success of the cluster model. First, both organizations in the local public sector and firms in the private sector provide for capacity to industrial zones respecting to physical infrastructure, institutions, and human resources. Second, industrial cluster policy to provide industrial zones and capacity as semi-public goods can enhance regional economic growth in cases where an anchor firm operates under

increasing returns to scale<sup>4</sup>. Third, the minimum optimal size of production is defined according to the economies of scale and depending on the size of fixed capital of the related companies of anchor companies.

The Asian model combines well the *top-down* approach with the *bottom-up* approach. In the origin is always a *top-down* approach: the government acts not only as a catalyst and mediator but also setting national priorities and devising a challenging vision for the future. The flow of policy implementation is to establish an industrial zone, to invite an anchor company, and to promote its related companies to invest in the industrial zone. Further, the recipient country's government reduces its role in order to promote competition. It thereby transfers greater authority to local governments and makes more use of the public corporations and state enterprises at the same time as it gradually gives an increasing role to the market. The progress and spreading out of clusters and network creation in Asia by both national (and local) public enterprises and multinational corporations are considered fundamentals to the upgrading of Asia's industrial structures.

## 6. Conclusion

The cluster policy approach gives policy makers better chances for getting their priorities right. However, our literature review shows that both the cluster concept is usually poorly defined and very often some cluster characteristics, which are difficult to be manipulated by policy (spontaneity, informality, tacit knowledge, etc.), are overlooked. Additionally, the vagueness in the definition of cluster concept makes difficult the policy evaluation at the same time as the appealing of the "cluster brand" drives to an exaggerated optimism in the expected effects of cluster policy.

But this paper revolved around another paradox: why so many policy makers in the OECD countries use the clusters rhetoric inspired in the competitive advantages of Porter but, in practice, don't use the policy instruments needed to propagate clusters? The answer to this question is closely associated to the policy makers' faith on the

---

<sup>4</sup> Of course, this approach is facilitated by the fact that markets for sales in China are at an early stage of development and large enough for anchor companies to attain increasing returns to scale. However, increasing returns can be attained in many other countries and regions.

superiority of market over the government policy. However, this faith is more motivated by ideological convictions than by scientific principles. The cluster policy is not an exception to this hands-off approach that is spreading in the OECD countries giving policy a shift away from “picking winners” towards “letting the market pick winners”. But if this is the case why policy is needed? This paper provides arguments that show this is not the most appropriate strategy to boost economic development as the regions in the “Asian triangle of growth” demonstrate.

## References

- Arrow KJ (1962) The economic implications of learning by doing. *Review of Economic Studies* 29: 155–173.
- Asheim, B.T. and A. Isaksen (1997), “Location, Agglomeration, and Innovation: Towards Regional Innovation Systems in Norway?”, *European Planning Studies*, Vol. 5, No. 3, pp. 299-330.
- Baptista, Rui and Peter Swann (1998). Do firms in clusters innovate more?, *Research Policy* 27, pp. 525–540.
- Beaudry C, Schiffauerova A (2009) Who’s right, Marshall or Jacobs? The localization versus urbanization debate. *Research Policy* 38: 318–337.
- Benneworth, P., Danson, M., Raines, P. and Whittam, G. (2003) Confusing clusters: making sense of the cluster approach in theory and practice, *European Planning Studies*, 11(5), pp. 511–520.
- Bergman, E.M. and E.J. Feser (1999), “Industry clusters: a methodology and framework for regional development policy in the United States”, chapter 11 in OECD (1999) *Boosting Innovation: The Cluster Approach* OECD Publications Service, Paris, France.
- Boekholt, Patries and Ben Thuriaux (1999), “Public Policies To Facilitate Clusters: Background, Rationale and Policy Practices in International Perspective”, chapter 16 in OECD (1999) *Boosting Innovation: The Cluster Approach* OECD Publications Service, Paris, France.
- Boschma, R. (2005). “Proximity and Innovation: A Critical Assessment”, *Regional Studies* 39(1) pp. 61-74.
- Brachert, Matthias, Mirko Titze and Alexander Kubis (2011), Identifying industrial clusters from a multidimensional perspective: Methodical aspects with an application to Germany, *Papers in Regional Science*, Volume 90 Number 2, pp. 419-40.

- Braun, E., MacDonald, S. (1978) *Revolution in Miniature: The history and impact of semiconductor electronics*. Cambridge: Cambridge University Press.
- Brenner Thomas and Charlotte Schlump (2011): Policy Measures and their Effects in the Different Phases of the Cluster Life Cycle, *Regional Studies*, 45:10, 1363-1386
- Buerger, Matthias and Uwe Cantner (2011). The regional dimension of sectoral innovativeness: An empirical investigation of two specialized suppliers and two science-based industries, *Papers in Regional Science*, Volume 90 Number 2 June 2011, pp. 373-394.
- Ceglie, Giovanna, Michele Clara and Marco Dini (1999), "Cluster and network development projects in developing countries: lessons learned through the UNIDO experience" chapter 11 in OECD (1999) *Boosting Innovation: The Cluster Approach* OECD Publications Service, Paris, France.
- Coe, David, and Elhanan Helpman (1995), "International R&D Spillovers." *European Economic Review*, Vol. 39(5), pp. 859-87.
- Coe, David, Elhanan Helpman and Alexander Hoffmaister (1997), "North-South R&D Spillovers", *Economic Journal*, Vol. 107, pp. 134-49.
- Ciccone, A. and R. E. Hall, 1996. Productivity and the Density of Economic Activity. *American Economic Review*, 86 (1): 54-70.
- Ciccone, A. 2002. Agglomeration Effects in Europe, *European Economic Review*, 46: 213-227.
- Cooke P (2001) Clusters as key determinants of economic growth: The example of biotechnology. In: Mariussen A (ed) *Cluster policies – cluster development?* Nordregio Report 2001/2, Stockholm.
- DAVID, P. A. & J. L. ROSENBLOOM (1990), Marshallian factor market externalities and the dynamics of industrial location. *Journal of Urban Economics* 28, pp. 349–370.
- de Groot, H. L. F., Poot, J. & Smit, M. J. (2008). Agglomeration externalities, innovation and regional growth: Theoretical perspectives and meta-analysis. (Department of Economics Working Paper Series, Number 1/08). Hamilton, New Zealand: University of Waikato.
- Duranton, Gilles and Diego Puga, 2001. "[Nursery Cities: Urban Diversity, Process Innovation, and the Life Cycle of Products](#)," [American Economic Review](#), vol. 91(5), pages 1454-1477.
- Edquist, C. and B. Johnson (1997). 'Institutions and organisations in systems of innovation', in C. Edquist (ed.) *Systems of Innovation: Technologies, Institutions and Organizations*. London and Washington: Pinter/Cassell Academic.

- Enright M (1996) Regional clusters and economic development: A research agenda. In: Staber U, Schaefer N V, Sharma B (eds) *Business networks: Prospects for regional development*. De Gruyter, New York.
- Feldman, M. (2000) Location and Innovation: the new economic Geography of innovation, spillovers, and agglomeration. In GL Clark, M. Feldman, and M. Gertler (eds.). *Oxford Handbook of Economic Geography*. Oxford: Oxford University Press, pp. 373-394.
- Feldman, M, and Audretsch DB. 1999. Innovation in cities: science-based diversity, specialization and localized competition. *European Economic Review* 43(2): 409–429.
- Florida, R. (2002) Bohemia and Economic Geography, *Journal of Economic Geography* 2: 55-71.
- Frenken, K., FG Van Oort, and T. Verburg (2007). Related variety, unrelated variety and regional economic growth, *Regional Studies* 41(5): 685-697.
- Gertler M (2003) Tacit knowledge and the economic geography of context, or the undefinable tacitness of being (there). *Journal of economic geography* 3(1): 75-99.
- Glaeser, E. L. and J. D. Gottlieb, 2009. The Wealth of Cities: Agglomeration Economies and Spatial Equilibrium in the United States. *Journal of Economic Literature*, 47: 983-1028.
- Glaeser Edward L, and David Maré. 2001. Cities and Skills. *Journal of Labor Economics*. April;Vol. 19(No 2):316–342.
- Glaeser, Edward L., Hedi D. Kallal, Jose A. Scheinkman and Andrei Shleifer, 1992. "[Growth in Cities](#)," [Journal of Political Economy](#), vol. 100(6), pages 1126-52
- Grabher, G. (1993) The weakness of strong ties: the 'lock-in' of regional development in the Ruhr area. In G. Grabher (ed.) *The Embedded Firm: On the Socio-economics of Industrial Networks*, pp. 255–277. London: Routledge.
- Henning, M., J. Moodysson & M. Nilsson. 2010. *Innovation and regional transformation: from clusters to new combinations*. Malmö: Region Skåne.
- Huang, Z., X. Zhang, and Y. Zhu. 2008. The role of clustering in rural industrialization: A case study of Wenzhou's footwear industry. *China Economic Review* 19: 409–420.
- Isaksen A (1997) Regional clusters and competitiveness: The Norwegian case. *European Planning Studies* 5: 65–76.
- Jaffe, A., Trajtenberg, M., Henderson, R., 1993. Geographic localization of knowledge spillovers as evidenced by patent citations. *Quarterly Journal of Economics* 108 (3), 577–598.

- Jacobs, J., 1969. *The Economy of Cities*, Penguin, London.
- Jacobs, J., 1984. *Cities and the Wealth of Nations: Principles of Economic Life*, Vintage, New York.
- Keeble, D., Wilkinson, F. (Eds.), 2000. *High-Technology Clusters, Networking and Collective Learning in Europe*. Ashgate, Aldershot.
- Ketelhöhn, Niels W. (2006) The role of clusters as sources of dynamic externalities in the US semiconductor industry, *Journal of Economic Geography*, 6 (5): 679-699.
- Krugman, P. 1991. *Geography and trade*. Cambridge, MA: MIT Press.
- Leslie, S. W. (2000) The biggest “Angel” of them all: the military and the making of Silicon Valley. In M. Kenney (ed.) *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*. Stanford, CA: Stanford University Press, 48–67.
- Lorenzen, Mark (2001): *Localized Learning and Policy: Academic Advice on Enhancing Regional Competitiveness through Learning*, *European Planning Studies*, 9:2, 163-185
- Macher, J. T., Mowery, D. C., Hodges, D. A. (1998) Reversal of fortune? The recovery of the US semiconductor industry. *California Management Review*, 41: 107–136.
- Malmberg, A., Maskell, P., 2002. The elusive concept of localization economies: towards a knowledge-based theory of spatial clustering. *Environment and Planning A* 34 (3), 429–449.
- Malmberg, Anders and Maskell, Peter, 2006, “Localized Learning Revisited.” *Growth and Change* 37(1): 1-18.
- Markusen, Ann (1996), “Sticky Places in Sloppy Space: A Typology of Industrial Districts”, *Economic Geography*, vol. 72(3), 293-313.
- Maskell P. and A Malmberg (1999) Localised learning and industrial competitiveness, *Cambridge Journal of Economics*, 23 (2), 167-185.
- Maskell, P., Eskelinen, H., Hannibalsson, I., Malmberg, A. and Vatne, E. (1998) *Competitiveness, localised learning and regional development. Specialisation and prosperity in small open economies*, London: Routledge
- Marshall, A. 1920. *Principles of Economics* (8th ed.) London: Macmillan. (Original work published 1890).
- Martin, R. & Sunley, P. (2003). “Deconstructing Clusters: Chaotic Concept or Policy Panacea?” *Journal of Economic Geography*, 3 (1), pp. 5-35.
- Morgan, Kevin (2004). “The exaggerated death of geography: learning, proximity and territorial innovation systems” *Journal of Economic Geography*, 4, pp. 3-21.

- Morris, P. R. (1990) A History of the World's Semiconductor Industry. London: Peter Peregrinus Ltd.
- Neffke, Frank, Martin Svensson Henning, and Ron Boschma, 2008. "[Surviving in agglomerations: Plant evolution and the changing benefits of the local environment](#)," Papers in Evolutionary Economic Geography (PEEG) 0820, Utrecht University, Section of Economic Geography.
- Neffke F, Henning M, Boschma R, Lundquist K-J, Olander L-O (2011) The dynamics of agglomeration externalities along the life cycle of industries. *Regional Studies* 45: 49–65.
- Nelson, R. and E. Phelps (1966), "Investment in Humans, Technological Diffusion, and Economic Growth", *American Economic Review*, Vol. 61, pp. 69-75.
- Nilsson, Magnus. 2008. A Tale of Two Clusters: Sharing Resources to Compete. Department of Business Administration. Lund, Lund University. PhD: 349.
- OECD (1999), *Boosting Innovation: The Cluster Approach*, OECD Publications Service, Paris, France.
- Peneder, Michael (1999), "Creating a coherent design for cluster analysis and related policies: the Austrian "tip" experience", chapter 14 in OECD (1999) *Boosting Innovation: The Cluster Approach* OECD Publications Service, Paris, France.
- Perry, Martin (2010a). *Controversies in Local Economic Development: Stories, Strategies, Solutions*. Abingdon: Routledge.
- Perry, Martin (2010b). "Controversies in Local Economic Development". *Local Economy*, 25(7): 527-534.
- Argentino Pessoa, 2004. "[Institutional innovations, growth performance and policy](#)," [ERSA conference papers](#) ersa04p157, European Regional Science Association.
- Pessoa, Argentino. 2010. "[Competitiveness, Clusters and Policy at the Regional Level: Rhetoric vs. Practice in Designing Policy for Depressed Regions](#)," FEP Working Papers 386, Universidade do Porto, Faculdade de Economia do Porto.
- Polanyi, M. 1967. *The Tacit Dimension*. London, Routledge.
- Porter, M. 1990. *The Competitive Advantage of Nations*. New York, United States: Free Press.
- Porter, M. 1998. "Clusters versus Industrial Policy." In: M. Porter, editor. *On Competition*. Cambridge, United States: Harvard Business School Press.
- Porter, M. (2000) Location, competition and economic development: local clusters in the global economy, *Economic Development Quarterly* 14, 15-31.



- Potter, Antony and H. Doug Watts (2011). Evolutionary agglomeration theory: increasing returns, diminishing returns, and the industry life cycle, *Journal of Economic Geography*, 11(3): 417-455.
- Putnam, R.D. (1993). *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton: Princeton Press.
- Raines, P (2002) 'Cluster policy – does it exist?' in Raines, P (ed.) *Cluster Development and Policy*, Aldershot: Ashgate, 21-33.
- Rodríguez-Clare, Andrés (2007) Clusters and comparative advantage: Implications for industrial policy, *Journal of Development Economics*, Volume 82, Issue 1, January 2007, Pages 43-57.
- Rodrik, Dani (2003), "Growth Strategies", NBER Working Paper 10050, National Bureau of Economic Research.
- Roelandt, Theo J.A. and Pim den Hertog (1999), Cluster Analysis and Cluster-Based Policy Making: The State of The Art, chapter 17 in OECD (1999) *Boosting Innovation: The Cluster Approach* OECD Publications Service, Paris, France.
- Romer PM (1986) Increasing returns and long-run growth. *The Journal of Political Economy* 94: 1002–1037.
- Rosenfeld, Stuart (2005) Industry Clusters: Business Choice, Policy Outcome, or Branding Strategy? *Journal of New Business Ideas and Trends*, 3(2), pp. 4-13.
- Rosenthal, S. S. and W. C. Strange (2003), "Geography, Industrial Organization, and Agglomeration," *Review of Economics and Statistics* 85 (2), 377-393.
- Rosenthal, S.S., and W.C. Strange. 2004. "Evidence on the Nature and Sources of Agglomeration Economies." in J.V. Henderson, J.F. Thisse (eds) *Handbook of Urban and Regional Economics*. Volume 4. Amsterdam, The Netherlands: Elsevier Science Publishers, pp. 2119-2171.
- Ruan, J. and X. Zhang. 2009. Finance and cluster-based industrial development in China. *Economic Development and Cultural Change*: 58:143–164, October 2009.
- Saxenian, A. (1994) *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge, MA: Harvard University Press.
- Scherer, F.M. 1982. "Demand-Pull and Technological Innovation: Schmoockler Revisited," *Journal of Industrial Economics* 30(3): 225-238.
- Schmitz, H. 1995. Collective efficiency: Growth path for small-scale industry. *Journal of Development Studies* 31 (4): 529–566.
- SFIDB (2011), Shanghai Foreign Investment Development Board (2011), *Investment Policies. Invest Shanghai*, Shanghai Foreign Economic Relation & Trade Commission.

- Smith, T. W. (2000), Semiconductors. Standard & Poor's Industry Surveys, New York.
- Sonobe, T., and K. Otsuka. 2006. Cluster-based industrial development: An East Asia model. New York: Palgrave MacMillan.
- Spencer G, Vinodrai T, Gertler M, Wolfe D (2009) Do clusters make a difference? Defining and assessing their economic performance. *Regional Studies* 34: 1-19.
- Steiner, M. (Ed.) (1998) *Clusters and Regional Specialisation: On Geography, Technology, and Networks*. London: Pion.
- Storper, M. (2009) The economics of context, location and trade: another great transformation?. In G. Becattini, M. Bellandi, L. De Propris (eds) *The Handbook of Industrial Districts*, pp 141–157. Cheltenham: Edward Elgar.
- Tödtling, Franz, Patrick Lehner, and Alexander Kaufmann (2009) Do different types of innovation rely on specific kinds of knowledge interactions? *Technovation* 29, 59–71.
- Walenza-Slabe, Erik (2012), *Emerging Chinese Innovation Ecosystems: Implications of China's improving innovation competitiveness for companies and professionals*, Applied Value Group (Shanghai).
- Williamson, John (1990), "What Washington Means by Policy Reform", in J. Williamson, ed., *Latin American Adjustment: How Much Has Happened?* Washington: Institute for International Economics.
- Woodward D. and Guimaraes P. (2009). "Porter's Cluster Strategy and Industrial Targeting" in *Targeting Regional Economic Development* edited by Stephan J. Goetz, Steven Deller and Tom Harris. Routledge, pp. 68-83.