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Cluster approach and policymaking: clustering in Dresden*

Abstract: The cluster approach could be understood both as analytical method and economic development policy. Dresden would be an interesting study case for identifying the main operative elements of the term. The reason is the existing concentration of activities related to the so- called high-tech sector.
Keywords: cluster, economic development, policy making.
JEL codes: R11.

1. Introduction: defining Cluster Approach

The Cluster Approach is a model for explaining how regional economic development can be influenced by comprehensive identification of economic and geographic interdependencies. A clear scheme proceeds on the performance of the main development actors, setting compatible gains toward the common goal of regional growth. This attuned behaviour is the result of a conscious policy with an impact in the regional economic development (see Figure 1).

The cluster approach focuses on those agglomerations of business activity with special trade viability in the world market. Moreover, the emphasis lies on the intensive use of knowledge and on developing positive synergies between different network members.

According to Jacobs (1997), the cluster approach focuses on those concentrations of business activity which have already proven their strength and viability on the world market. However, the emphasis lies then on the intensive use of knowledge in these strong clusters and on enhancing constructive interaction between different parties in the network. The new approach based on clusters has gained in

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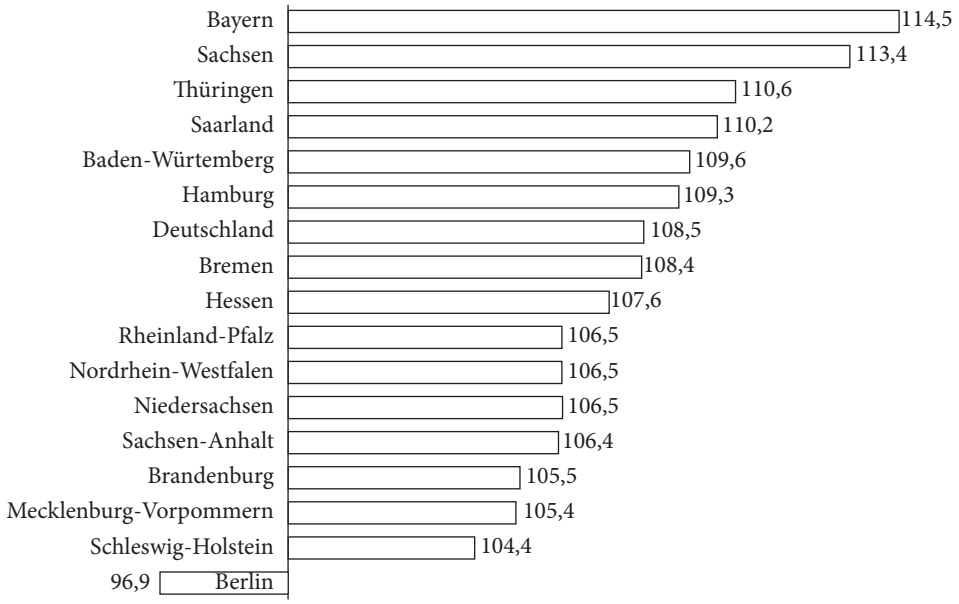

Figure 1. German regions GDP 2007 (2000 = 100)
Source: Arbeitskreis Volkswirtschaftliche Gesamtrechnung der Länder 2008

popularity especially since governments started concentrating more on their specific strengths. Jacobs includes a very particular element of the cluster approach model: the role of politics[1].

The new approach based on clusters has gained in popularity especially since governments (Ketels 2007) are considered to play a crucial role in strengthening local capabilities and in coordinating local cooperation, toward a common goal of economic development (OECD 2005). This aspect is interesting because it determines a perceptive dimension of decision-making and a definition of appropriate administrative boundaries between public and private spheres. This mixture takes special relevance in the proactive dimension of the cluster approach as an economic development strategy based on competitiveness. Then, it appears as a complex net of interaction among different actors within and between levels with multiple linkages.

Clusters arise because they increase the productivity with which companies can compete, and then the ability of a region for building a cluster will establish the capacity of its settled firms to compete with other companies, given a certain market with high levels of competition among agents.

By admitting the connection between companies' performance and regional welfare, the cluster characterizes an approach to understand the market foundations of economic development. This relationship combines the operating practices and stra-

[1] See also Gorynia, Jankowska and Owczarzak 2007.

tegies of firms as well as the business inputs, infrastructure, institutions, and policies that constitute the environment in which regional firms compete (Porter 1990).

The phenomenon of regional integration has a positive effect in relocation of specialized activities (Pontes 2003). Relocation of factors depends on the comparative advantages which the specific region possesses. This acknowledgment of comparative advantages helps local authorities to design a win-win strategy. It is based on the cooperation between partners of different nature (political, academic, financial, and industrial) due to a common goal of local development into a competitive global scenario.

Another study considers four measures for identifying a cluster: the industry output concentration, the existence of cluster externalities, the presence of central actors, and finally, a certain local culture (Stuchtey 2000).

2. Some theoretical dimensions

Such a model integrates three different theoretical dimensions to explain the business concentration as an economic situation.

First, there is a geographical dimension focusing on the localization process that has been explained masterly by Krugman (1998) and can be defined as New Economic Geography (NEG) paradigm. Second, there is a technological dimension considering economic performance of businesses based on high technology derived from Michael Porter's works. Third, there is a functional dimension based on cooperation gains in terms of John Nash's equilibrium. The combination of these three dimensions forms the cluster approach.

The first dimension underlines the effect of removal factors mobilization barriers, the reduction of transport costs on business location and gains derived from such concentration. Therefore, because of globalization and economic integration the tendency towards such a concentration has increased. The second dimension, by focusing on the most competitive areas of economy, suggests that regional growth is a function of key sectors selected according to their economic dynamism. A region would profit from a "growth pole" enhancing economic development because of the extraordinary performance of its members in market growth or turnover results. The definition of such a "pole" is a consequence of the rational identification of the region's comparative advantage.

The third dimension is adapted by a multiplication of institutional decision centres, vanishing of exclusive competencies among them and confusion between public-private economic circles. Examples of such a phenomenon are deregulation, interregional competition within countries and cross-border partnerships. Game theory can be defined as the formal study of conflict and cooperation. The theoreti-

cal concepts may be applied whenever several agents interact. These agents may be varied: from individuals, to groups or firms, or any combination of these. All in all, game theory provides a language for modelling, structuring, analyzing, and understanding strategic scenarios[2].

All dimensions include the disappearance of clear governance levels from international to local scenarios and the resulting self-definition of members of each rank. The cooperation between such actors could determine increased gains in opposition to a confronted strategy.

2.1. The actors in the cluster approach

The Cluster Approach is an economic development model based on the effect of cooperation among a certain number of economic agents. This economic agent is named as actor. In this section, the actors of the cluster approach will be identified and described. These core participants are the political trigger, firms, financiers, and academia (see Figure 2). These four actors would join forces and coordinate efforts[3].

After establishing a set of compatible aims, the policy trigger would create incentives in order to attract partners, maintain their involvement, and persuade their cooperative actions. The validity of the Cluster Approach as a model depends on its simplicity and the capacity to introduce a hierarchy of factors.

Therefore, it is necessary to suggest an organization, considering such a complex net, the vast range of interaction among different actors within and between levels, and the multiple linkages. Recognizing the complexity of a real world scenario, the analysis should limit the number of participants to those that have the capacity to create, supply or control productive factors. Then, the functional nature will categorize every single actor and it allows a substantial simplifying of the model.

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[2] It is possible to differentiate between cooperative and non-cooperative. The first consider games with respect to the relative influence of various players, or how a coalition may affect proceeds. In this sense, a Nash equilibrium recommends a strategy to each player that the player cannot improve upon unilaterally, that is, given that the other players follow the recommendation. Since the other players are also rational, it is reasonable for each player to expect his opponents to follow the recommendation as well (Turocy and von Stengel 2001). The Nash's model fits within the cooperative framework focusing on the outcome of a bargaining process. In the case of the cluster players cooperate because they hope that cooperation will induce further cooperation in future. This point is based on that there will always be the possibility of future play and perfectly adjust to the kind of repeated games used to give a solution to the prisoner's dilemma (Varian 2006).

[3] Some authors suggest that regional economic development is stimulated for a smaller number of participants. Nonetheless, including the financial sector, the model enjoys more flexibility and a better adaptability to the actual characteristics of market. For example, this is expressed in the "Triple helix" model, a configuration with a system of university-industry-government relations (Bakkevig 2003). See also Etzkowitz and Leydesdorff (1997) and Etzkowitz and Leydesdorff (1998).

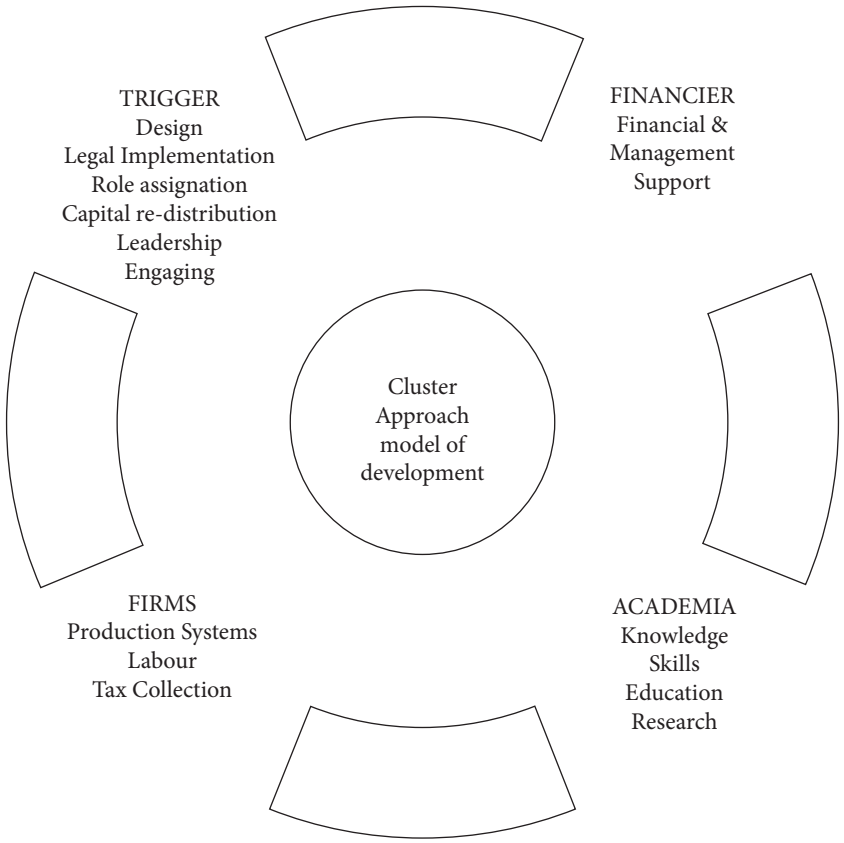

Figure 2. The funtioning actors

The resulting method defines the actor according to a horizontal scheme because of political, social, economic characteristics, and so on.

However, the reader should be aware that it would be possible to define vertical levels, distributing actors according to size and geographical presence: local, regional, national or international. Yet, because it is very difficult to define the margins of such levels at a glance, this paper will establish such a hierarchy when introducing every stage of development. In any case, previous and successful models of the cluster approach identify all the mentioned actors as well as their role as part of a limited geographical area. For example, Waits (2000) studies the relations between the different actors in the cluster (leaders, suppliers, and supporters) and the key linkage with the global scenario. There is a more comprehensive work like the model of Raines (2001). He applies tools of comparison between several cases within the European Union. He also includes several layers of decision- making and their interaction in a unique business-academia-government environment.

3. Some sectors clustering in Dresden

As we have seen above, the Cluster Approach is built with the interaction of a limited number of agents called actors. The nature of each actor varies according to its capabilities and aims. In this sense, we were able to distinguish four main actors: financier, entrepreneur, academia and politics or trigger.

We also mentioned that the Cluster Approach has three main stages of development if considering the structural needs of the system in different development phases. The first step was to locally design and create the productive foundations of the system. The second one was the implementation and correction of the system. Finally, we mentioned the stabilization and institutionalization of the cluster network, allowing sustainability and permanence.

If applying the model to Dresden and Saxony, we will assign the different roles in the region. But, in order to do so we need to consider which kind of cluster is in the region.

From all the different activities that take place in Dresden it is possible to identify the following clusters: biotechnology, microelectronics, nanotechnology and new materials.

3.1. Biotechnology

The Biotechnology Cluster seems to inherit a long lasting tradition. The city of Dresden claims that the success story of the regional pharmaceutical industry is 120 years old[4]. Moreover, in 1911, Karl August Lingner[5] founded a bacteriological department which became the Sächsisches Serumwerk and the Institute for Bacteriological Therapy. Nowadays, this institution belongs to GlaxoSmithKline and the research focuses on vaccines[6]. However, years before, in 1835, Friedrich von Heyden founded Drogerie & Färbewaren-Handlung Gehe &Co. In 1874, this firm was responsible for the first commercial scale synthesis of salicylic acid. Lately, this firm, jointly with the company Dr. Madaus & Co has established the Arzneimittlewerk Dresden. Now, known as AWD Pharma, it is the largest pharmaceutical firm in Saxony.

It is also remarkable that the phenomenon of spin off is related to these companies. As an example, the firm Elbion AG emerged in 2002 from the research department of the Arzneimittelwerk Dresden. This firm gives jobs to approximately

[4] *Living Science: Biotechnology in Dresden*, Landeshaupstadt Dresden, Department of Economic Development, Dresden, 2005, p. 3.

[5] This entrepreneur was related to the first industrial dental hygiene products and founder of the Deutsches Hygiene Museum.

[6] GlaxoSmithKline has invested 94 million Euros in Sächsisches Serumwerk to double its production by 2008. Landeshaupstadt Dresden, 2005a, p. 11.

a hundred scientists who develop drugs against disorders of the nervous system and respiratory tract. These works are developed in joint research with GlaxoSmithKline[7]. This example perfectly supports the assumption that, in a cluster model, firms that can be seen as global competitors are able to join efforts on the local basis. This co-operation has an institutionalized tool in the BioInnovationsZentrum. The centre is a joint project of the TechnologieZentrum Dresden GmbH and the Technische Universität Dresden (TU-Dresden). The infrastructure available includes offices or laboratories that are used together by the TU-Dresden and private companies[8]. In addition, the BioinnovationsZentrum offers to its members not only technology but entrepreneur services (i.e., legal advice or marketing).

Another example of institution is BioMet e.V. This network combines three areas of interest: medical, biological and technological research[9]. The network also works with the BioinnovationsZentrum and receives public funding[10].

The research is so interdisciplinary that in the field of biomaterials there is a co-operation for developing biopolymers to be used as connectors by the IT and microelectronics industry[11].

3.2. Nanotechnology

Very much related to the advances in microelectronics is the nanotechnology sector. Nowadays and surely in the future, it is one of the most innovative branches of science. The Nanotechnology Cluster in Dresden includes areas like microelectronics, biotechnology, new materials and systems engineering. It also concentrates one of every five companies in Germany of this sector[12]. The reason for that concentration has to be found in the several research centres existing in the region. These research centres have very modern facilities that allow scientists to explore

[7] GlaxoSmithKline purchased the exclusive rights for the development, certification, production and sales of the drug "AWD 12-281" consequence of the research done by Elbion AG. Landeshaupstadt Dresden, 2005a, p. 4.

[8] JADO Technologies or Cenix BioScience GmbH.

[9] The members of the network are: the Deutsche Forschungsgemeinschaft (DFG) -Forschungszentrums "Regenerative Therapien", the Biotechnological Centre of the TU-Dresden, Leibniz Institute for Polymer Research Dresden e. V., Max Planck Institute for Molecular Cell Biology and Genetics, Max Bergmann Centre of the TU-Dresden, Fraunhofer Institute for Material and Radiation technology and Research Centre Rossendorf e. V. Landeshaupstadt Dresden, 2005a, p. 7.

[10] The official amount is 24 million Euros until 2006. Landeshaupstadt Dresden, 2005a, p. 5.

[11] It seems that due to their specific characteristics such DNA-like molecules allow smaller distances between conductors compared to conventional materials. The aims of these research centres seem almost taken from a science-fiction novel: regeneration of human tissues avoiding transplantation or genetic reconstructions. Landeshaupstadt Dresden, 2005a, p. 6-7.

[12] There are around 80 firms located in Dresden that also hosts about 50 scientific facilities (Landeshaupstadt Dresden, 2005b, p. 3).

these fields as real pioneers of knowledge[13]. This research is transferred into marketable products due to the co- operation with private companies. This is because, considering the special nature of the final product (on the edge of scientific research), most of the companies are spin offs from university and research centres facilities. A usual way to cooperate is, for example, to create a mini-lab that considers a specific research topic. In these mini-labs a research institute offers its facilities to a firm in order to test or develop specific products. This is very convenient for the company because it has access to the otherwise expensive facilities and to the newest scientific knowledge and the research institute receives guidance about the fields that may potentially be in demand in the future (adapting the theory to actual practical issues).

In addition, there are also joint ventures with big corporations like Advanced Micro Devices Inc. (AMD) or Infineon. One of the latest projects, the Fraunhofer-Gesellschaft Centre Nanoelectronic technologies (CNT), is the result of the cooperation among the Fraunhofer-Gesellschaft, the TU-Dresden, AMD and Infineon in the area of semiconductors. companies have come to Dresden considering the advantages derived from goal synchronization with political actors as well as the advantage of an investigation centre, source of qualified workers and possibility to share research and development costs. Some examples of the advantages of Dresden are a relatively big number of highly-trained individuals, with their own laboratories and materials, paid with public money or whose scholarship or financing, given by companies, have public incentives.

The importance of Dresden as a location for research on and production of nanotechnology is remarkable and the city encourages this role by supporting events such as seminars or fairs. In 2005, for example, Dresden celebrated the "Year of Nanotechnology" and in the same year organized the "4. Internationales Nanotechnologie Symposium"[14].

Other interesting fields of nanotechnology in Dresden can be found in the development of biomaterials. These materials are designed in order to avoid the usual danger of body rejection. This product is the result of joint projects between medicine, biology and technology laboratories[15]. Many times, the result of such cooperation

[13] Rossendorf e. V. Institute, "Gottfried Wilhelm Leibniz" Institute, Fraunhofer-Institute for Material and Radiation technology (IWS) or Max Planck Institute are in the region with specific labs for these research fields. The tools available are very expensive and only affordable in cooperation. For example, an existing pulsed magnet field used for basic re- search or industry oriented semi-conductors' tests was an investment of 25 million Euros. Landeshaupstadt Dresden, 2005b, p. 3.

[14] This was the second time for Dresden. The event is a project organized by Dresden, Karlsruhe, Strasbourg and the Association of German Engineers (VDI). The partners in industry were coming from automotive, electronics, life science, materials, optics and surfaces areas.

[15] Max Bergmann Zentrum fur Biomaterialen: this centre is the result of the cooperation between TU-Dresden and "Gottfried Wilhelm Leibniz" Institute of Polymer Research. Landeshaupstadt Dresden, 2005b, p. 8.

is a company. In this case, the research centres offer not only expertise but leadership. An example of a successful spin off is Namos GmbH that combines outstanding research on engineering and biology (coming from "Gottfried Wilhelm Leibniz" Institute for Solid State and Materials Research and the TU-Dresden Institute for Genetics). This is possible because Dresden maintains institutions responsible for transferring knowledge, such as BioMeT.

4. Focusing on the cluster

Recently, a study compared the economic performance and potential of the main German cities. In the paper, Dresden was among the first 10 cities of the country and was the best of all East German cities (including Berlin). It was also the most dynamic city German wide if considering the accumulated development ratio between 2000 and 2005[16]. Such a remarkable performance was based on its ability of attracting foreign investment, the existence of a highly-qualified work force, the high occupation ratio among elderly citizens, the growing figures of GDP and income per head and, finally, its productivity[17].

So far, it has been possible to recognize enough elements to define Dresden as a cluster of the high-tech industry. Again, this term refers to the tendency of some companies to cluster in certain locations. Usually, this fact is more a result of the creation of communication and cooperation nets between companies in an area rather than the product of corporative decisions. These nets are established on the existence of research institutes, universities, financing services and public agencies in an environment of internal cooperation and external competition (Raines, 2001). But, is it possible to identify such a cluster? The term cluster in the proposed model says more than the concentration of firms in a certain area. The cluster approach considers a conscious strategy of economic development based on cooperation of differentiated actors. The approach considers four main kinds of players named trigger, entrepreneur, financier and academia. Each one of them exploits its specific skills making the particular interest compatible with the common goal that maintains networking.

It is a fact that the Landeshauptstadt Dresden includes information about administration, courts and services following the information about industry and research in the same section named "Economy" in its internet page. It is a fact that the region presents a remarkable record of newly settled firms and research centres strongly related to the high-tech brand. Moreover, the city of Dresden belongs

[16] "Deutsche Grosstädte im Vergleich", IW Consult GmbH Köln, 30. Juni 2006.

[17] "Starken-Schwachen-Profil Dresden", IW Consult GmbH Köln, 30. Juni 2006.

to the European Cluster Alliance (Ketels, 2007,). The term cluster goes beyond the concentration of business in a specific industry. In this case, high-tech and applied research are the result of an innovative milieu with a myriad of effects in many fields. As we have seen above, the Cluster Approach is built with the interaction of a limited number of agents called actors. The nature of each actor varies according to capabilities and aims. In this sense, we were able to distinguish four main actors: financial, entrepreneurial, academic and political or trigger.

We also mentioned that the Cluster Approach has three main stages of development if considering the structural needs of the system in different development phases. The first step was to locally design and to create the productive foundations of the system. The second one was implementation and correction of the system. Finally, we mentioned stabilization and institutionalization of the cluster network, allowing sustainability and permanence.

If applying the model to Dresden and Saxony, we will assign the different roles in the region.

4.1. The trigger

For the case of Dresden, it would be possible to identify the trigger with the government of Saxony, which, chasing the economic reactivation of the region, welcomes the allocation of new firms and promotes system interactions. At the beginning of the 1990s, the social situation of economic instability and social dissatisfaction, described above, demanded an ambitious plan to develop the region.

The key idea was to attract business to the region. However, the relative distance between Saxony and the main industrial axis or transport channels determines focusing on non-traditional fields, such as heavy industry. As an opportunity the horizon of enlargement was present, now as an unchangeable situation. Diving in the "inventive tradition" of Saxony and considering the existence of the reputed educational institutions, the public leaders chose the high-tech path at the moment when e-business was booming. The supported sectors are branded as high-tech and innovative activities. An interesting thing is that, in general, sectors are supported as a whole, without considering specific firms. The focus is on creating a system of networks with research centres, university, public agencies, entrepreneur associations[18] and, recently, with a wide range of services. The services provided by the Department of Economic Development are[19]:

[18] For example, The Entrepreneur Club or Dresden International Friends. Both institutions organize several events from seminars to concerts that maintain fluent communication between the main Dresden personalities.

[19] All this information is provided by the Department of Economic Development itself. The final statement is specially interesting because, as mentioned, the Department belongs to the City of Dresden's public administration.

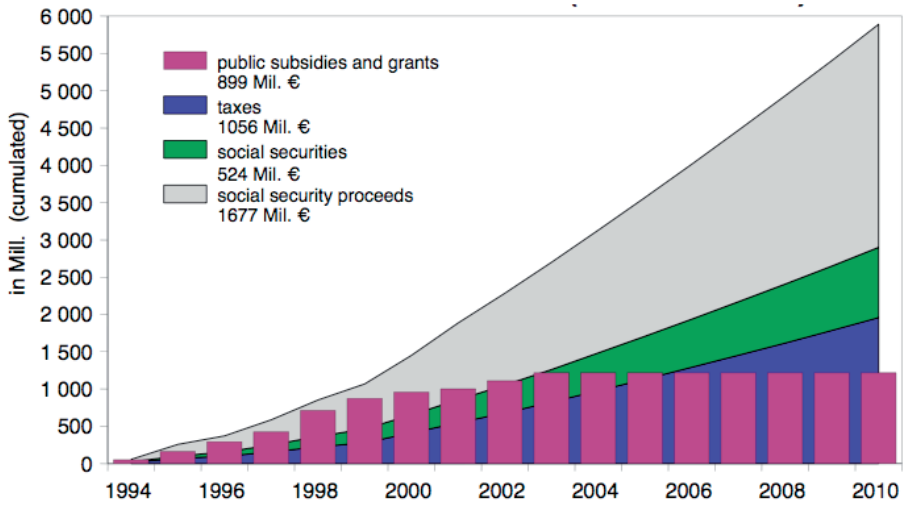

Figure 3. Taxation and Investment AMD
Source: SMWA 2007

– approval management;
– real estate management;
– promotion of business start-ups;
– contact with research institutions and networks;
– location marketing; and
– lobbying.

The Dresden trigger has attracted investment by a double interaction between marketing efforts and deployed incentives, both financial (tax incentives or capital aides) and non-financial (infrastructure or personal connection via sponsored events). The long-term interest of politicians could be, for example, to assure population stability in Saxony (guaranteeing future tax contributions) or to gain political support in the region for the party in office.

These institutions were unable to face international competition after losing the COMECON primary market. Suddenly, a very well-qualified human capital was available. This potential was used in order to build the network Silicon Saxony and maintain employment.

According to the Deutsches Institut für Wirtschaftsforschung (DIW) study (see Figure 3)[20], only due to direct taxation Saxony will obtain a 38% surplus from the investment by 2010[21]. The study underlined, even in the worst possible scenario, a prognosis of a positive effect on Saxony's taxation system.

[20] See Edler 2002.

[21] Without considering the reduction in social security expenses (0.944 billion Euros) and additional social security proceeds (2.988 billion Euros). The study considers, for example, the reduction in unemployment subsidies (Edler 2002, p. 10).

5. Conclusions

As we have seen, there are four measures for identifying a cluster: the industry output concentration, the existence of cluster externalities, the presence of central actors and finally, a certain local culture. All these elements are present in Dresden. Therefore, it is possible to admit that there is a cluster in Saxony's capital.

The next question is whether it is possible to identify the cluster approach also in this region. Applying the basic cluster approach framework to the case of Dresden, the trigger would be the government of Saxony. At the beginning of the 1990s, the social situation of economic instability and social dissatisfaction, described previously, demanded an ambitious plan to develop the region. The key idea was to attract business to the region. The relative peripheral situation of the area (distance from the main industrial axis or transport channels) determines focusing on non-traditional fields (like heavy industry). Confronted with the challenge, it was possible to find an imaginative solution: Diving in the inventive tradition of Dresden and considering the existence of the reputed Technische Universität Dresden, the public leaders chose the high-tech path at the moment when e-business was booming.

The Dresden "trigger" attracted investment by a double interaction between marketing efforts and deployed incentives, both financial (tax incentives or capital aides) and non-financial (infrastructure or personal connection via sponsored events). The long-term interest of politicians could be, for example, to assure stable population numbers in Saxony (guaranteeing future tax contributions) or to gain political support in the region for the party in office.

Companies have come to Dresden considering the advantages derived from goal synchronization with political actors as well as the advantage of an investigation centre, source of qualified workers and possibility to share research and development costs. Some examples of the advantages of Dresden are a relatively big number of highly-trained individuals, with their own laboratories and material, paid with public money or whose scholarship or financing, given by companies, have public incentives[22].

There is an outstanding scientific community in the key areas of future industrial development: microelectronics, biotechnology, nanotechnology or new materials. These areas also maintain institutionalized connections with industry and service sectors because of the joint participation in formal networks.

Finally, there is also an important presence of the financial sector, not only of traditional formal banking but also venture capital. Moreover, this venture capital also takes part in sector networks and in maintaining constant contact with academia.

[22] For information regarding the economic performance of Dresden and Saxony see tables of Appendix.

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Appendix: Tables

Table 1. The Biotechnology Cluster

Business Enterprises
ABX-Advanced Biochemical Compounds GmbH Apogepha Arzneimittel GmbH AWD. Pharma Biotype Gesellschaft für molekularbiologische Analytik GmbH CenixBioScience GmbH Elbion AG Gene Bridges GmbH JADO Technologies GmbH Linde KCA GmbH/Linde AG Pharmatec Pharma-Maschinen GmbH Qualitype AG Sächsisches Serumwerk Dresden/GlaxoSmithKline
Research Facilities
DFG-Forschungszentrums "Regenerative Therapien" Fraunhofer Institute for Ceramic Technologies and Sintered Materials (IKTS) Fraunhofer Institute for Material and Radiation Technology (IWS) Forschungszentrum Rossendorf e. V. Hexal Synthech GmbH Leibniz Institute for Polymer Research Dresden e. V. Max Bergmann Centre for Biomaterials Dresden Max Planck Institute for Molecular Cell Biology and Genetics Medical Faculty Carl Gustav Carus TU-Dresden Biotechnological Centre (Biotec) TU-Dresden Medical Theoretical Centre
Educational Facilities
Berufschulzentrum für Agrarwirtschaft "Justus von Liebig" Berufliches Schulzentrum für Gastgewerbe BSZ Radebeul Technische Universität Dresden (TU-Dresden) Dresden Hochschule für Technik und Wirtschaft (HTW-Dresden) Berufsakademie (BA)-Sachsen-University of Cooperative Education in Saxony Max Planck Research School for Molecular Cell Biology and Bioengineering Sächsische Bildungsgesellschaft für Umweltschutz und Chemieberufe mbH
Networks
BioSaxony BioMeT (Biology-Medicine-Technology) e.V. GMBU Society for Development of Medical, Bio and Environmental Technologies
Technology transfer centre
BioInnovationsZentrum

Source: SMWA and Own Data.

Table 2. Employees in High-Tech Industries 2008 (% total)

Position	City	%	Total employees (in 1,000)
1	Dresden	8,7	62,6
2	München	8,5	181,7
3	Nürnberg/Erlangen	7,6	60,2
4	Karlsruhe	7,6	100,3
5	Berlin	7	102,2
6	Hamburg	6,9	65,9
7	Frankfurt/M	6,5	115,5
8	Köln/Bonn	6,3	113,5
9	Leipzig	6,2	29
10	Freiburg	6	63,3

Source: BITKOM 2008.

Table 3. Patents % per 100 000 Inhabitants, 2004–2007

Position	State	Value
1	Baden-Württemberg	6,0
2	Sachsen	3,0
3	Berlin	2,0
3	Brandenburg	2,0
3	Nordrhein-Westfalen	2,0
6	Bremen	1,0
7	Bayern	0,0
7	Schleswig-Holstein	0,0
9	Niedersachsen	–1,0
9	Saarland	–1,0
11	Hamburg	–2,0
11	Mecklenburg-Vorpommern	–2,0
13	Sachsen-Anhalt	–3,0
14	Thüringen	–5,0
15	Hessen	–13,0
16	Rheinland-Pfalz	–23,0

Source: Die Initiative Neue Soziale Marktwirtschaft (INSM) and WiWo 2008.

Table 4. % High-qualified Employees, 2007

Position	State	Value
1	Berlin	13,8
2	Sachsen	13,0
3	Hamburg	12,6
4	Hessen	11,6
5	Bremen	11,1
6	Baden-Württemberg	10,5
7	Thüringen	10,1
8	Bayern	9,8
9	Brandenburg	9,6
10	Nordrhein-Westfalen	9,3
11	Mecklenburg-Vorpommern	8,9
12	Sachsen-Anhalt	8,8
13	Niedersachsen	7,8
14	Saarland	7,7
15	Rheinland-Pfalz	7,3
16	Schleswig-Holstein	6,3

Source: Die Initiative Neue Soziale Marktwirtschaft (INSM) and WiWo 2008.

Table 5. Export Rates 2007

Position	State	Value
1	Sachsen	8,1
2	Hessen	7,0
3	Mecklenburg-Vorpommern	6,9
4	Sachsen-Anhalt	6,8
5	Thüringen	6,3
6	Baden-Württemberg	6,2
7	Nordrhein-Westfalen	6,0
8	Saarland	5,7
9	Berlin	5,3
10	Brandenburg	5,0
11	Bayern	4,7
12	Hamburg	4,6
13	Rheinland-Pfalz	4,5
14	Schleswig-Holstein	4,0
15	Niedersachsen	3,2
16	Bremen	–2,4

Source: Die Initiative Neue Soziale Marktwirtschaft (INSM) and WiWo 2008.

Table 6. Public Investment 2007

Position	State	Value
1	Sachsen	19,2
2	Brandenburg	16,0
3	Bayern	15,4
4	Thüringen	14,8
5	Sachsen-Anhalt	14,6
6	Mecklenburg-Vorpommern	13,9
7	Baden-Württemberg	12,0
8	Hamburg	11,5
9	Rheinland-Pfalz	10,9
10	Bremen	10,5
11	Niedersachsen	10,2
12	Schleswig-Holstein	10,1
13	Saarland	9,9
14	Hessen	9,5
15	Berlin	8,0
16	Nordrhein-Westfalen	7,7

Source: Die Initiative Neue Soziale Marktwirtschaft (INSM) and WiWo 2008.

Table 7. Public Debt (% 2004–2007)

Position	State	Value
1	Sachsen	–10,5
2	Bayern	–1,1
3	Mecklenburg-Vorpommern	–0,7
4	Hessen	3,0
5	Niedersachsen	3,8
6	Berlin	4,2
7	Hamburg	4,4
8	Nordrhein-Westfalen	4,7
9	Brandenburg	5,0
10	Baden-Württemberg	6,8
11	Rheinland-Pfalz	9,1
12	Schleswig-Holstein	9,7
13	Thüringen	10,6
14	Sachsen-Anhalt	11,6
15	Saarland	24,1
16	Bremen	26,5

Source: Die Initiative Neue Soziale Marktwirtschaft (INSM) and WiWo 2008.

Table 8. Public debt per capita 2007

Position	State	Value
1	Bayern	3.193
2	Sachsen	3.624
3	Baden-Württemberg	4.685
4	Hessen	6.637
5	Niedersachsen	7.278
6	Mecklenburg-Vorpommern	7.305
7	Brandenburg	7.455
8	Rheinland-Pfalz	7.668
9	Nordrhein-Westfalen	7.818
10	Thüringen	7.964
11	Schleswig-Holstein	8.909
12	Sachsen-Anhalt	9.527
13	Saarland	9.778
14	Hamburg	12.435
15	Berlin	16.957
16	Bremen	21.779

Source: Die Initiative Neue Soziale Marktwirtschaft (INSM) and WiWo 2008.