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Cluster Policy: Principles and a Toolbox



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Abstract

Cluster policy has become a method of choice for economic policymakers in many nations and regions in both industrialized and developing countries. Since the beginning of the 1990s, the policy is being perceived by politicians and practitioners as a way to anchor economic activity in locations even during gales of globalization. Yet no comprehensive theory of cluster policy has been formulated. Such a theory is necessary to establish a sound theoretical foundation for practical cluster promotion strategies if they are to stand a chance to systematically achieve their goals. Moreover, this theory must be linked with the general theory of economic policy. To gain policy relevance, the theory should offer a toolbox for cluster promotion practitioners and policy makers. This article proposes principles that integrate cluster policy in this broader theoretical context and suggests a toolbox.

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Cluster Policy: Principles and a Toolbox

1 Introduction

The enormous popularity that cluster policy has gained in the political sphere, in particular since Porter's (1990; 1998a; 1998b) work, has been accompanied by a gap between the scientific understanding of clusters and the practical implementation of cluster promotion strategies. The latter are rarely based on a sound understanding of the mechanics of clusters. This gap calls into question whether a cluster policy not grounded on a solid theoretical foundation can achieve its goals at all (Rehfeld 2006: 246; Bathelt and Dewald 2008; Kiese 2008c; Wrobel and Kiese 2009).

To develop sound cluster policies that can stand a chance to systematically achieve their goals and that are at the same time reconciled with other fields of economic policy, a comprehensive theory of cluster policy is needed. Such a theory has to build on the wide field of cluster theory developed by economics, economic geography, economic sociology, and regional science. Its main task is to bridge the gap to policy.

A theory of cluster policy can rest on two pillars, the first of which is a positive theory of cluster policy that attempts to explain why cluster policy is pursued the way it is in its practical implementation. Existing approaches use, for example, analytical tools of New Political Economy (Kiese 2008c; 2008d). The second pillar is a normative theory of cluster policy that describes how cluster promotion strategies should be designed and implemented to achieve their goals in a way that fits into the framework of a market economy, that is, without unduly distorting market mechanisms. In essence, such a cluster policy must live up to efficiency requirements. In the end, both aspects of the theory need to be integrated into a comprehensive theory of cluster policy that proposes pathways, for example, to devise institutions that enable cluster policy to be designed and implemented in the way the normative theory requires. Thus, the arena for cluster *politics* should be constructed so that it engenders solid cluster *policies* (Benner 2012c).

For now, the next major task towards a comprehensive theory of cluster policy is to build the normative part of the theory. To accomplish this, tools and principles for sound cluster policies are needed. Drawing on the work of Benner (2009; 2012a; 2012b; 2012c), this article suggests principles for cluster policy derived from cluster theory, empirical studies, and the general theory of economic policy, and proposes a comprehensive toolbox which makes it possible to put the theory into practice.

2 Towards a normative theory of cluster policy

Essentially, a cluster can be understood as "a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities" (Porter 1998a: 199). Considering the prevalence of agglomeration tendencies in many industries over time, affecting the dynamics of these industry-specific agglomerations can indeed be a lever for economic policy. Exerting such an influence on clusters is the core of cluster policy. The elaboration of a normative theory of cluster policy is thus essentially the search for effective ways to do so. But the notion that cluster policy can be basically everything that might affect clusters and clustering is not precise enough to construct a sound theory. Considering the difficulties in exactly defining and delimiting cluster policy and the host of attempts to do so (e.g. Boekholt and Thuriaux 1999: 384; Bruch-Krumbein and Hochmuth 2000: 69-70; Raines 2000: 9-10; Nauwelaers 2001: 100; Hospers and Beugelsdijk 2002: 382; Fromhold-Eisebith and Eisebith 2005: 1252; Kiese 2008d: 130; Ketels 2011: 8), a rigorous working definition that assigns cluster policy its place in economic policy has to be established. On this basis, the instruments and agents of cluster policy can be mapped.

Therefore, a normative theory of cluster policy that can serve as a theoretical basis for the formulation and implementation of individual cluster policies has to meet the following requirements (Benner 2012c: 69-70):

- First of all, the theory should clarify the location of cluster policy within economic policy. This is important to come up with a comprehensive definition of cluster policy and to elaborate its goals. A precise identification of the goals of cluster policy is important because it enables to assess realistically its perspectives to reach them before implementation and to evaluate its success afterwards.
- The relationship between the goals of cluster policy, supreme goals of economic policy in general, and specific goals of other fields of economic policy must be established. Here, some goal conflicts will show that must be solved. The question of market conformity is an especially critical one that has to be addressed.
- Cluster policy instruments that can affect cluster mechanisms derived from cluster theory (Benner 2009) and agents who can use them have to be identified. Criteria that guide the selection of cluster instruments to be applied and of the agents to do so need to be set up.

This will lead to a model of causal but contingent (Bathelt and Glückler 2003; 2012: 47-49) relationships that shed light on the possibilities to design and implement individual cluster policies based on sound theoretical reasoning.

To build such a model is the goal of the next sections. They will address the various steps mentioned.

3 Cluster policy as a part of economic policy

To characterize the nature and goals of cluster policy, it should be assigned its place within general economic policy. Its relationships with other fields of economic policy need to be established (Benner 2012c).

According to Welfens (2010: 516-518), there are six elementary fields of economic policy: economic constitutional policy, national market policy (called "Ordnungspolitik" in the tradition of German economics), integration policy, process policy, growth policy, and environmental policy. Although cluster policy can be influenced by and can itself influence all of these fields, it seems appropriate for the purposes pursued here to concentrate on the fields of economic policy that appear most relevant in a national and sub-national context, that is, (national) market policy, process policy, and growth policy. Environmental policy is best seen as a cross-cutting dimension of all other fields of (economic) policy.

Market policy is characterized by a long-term perspective. It designs the broad framework that economic agents are supposed to fill with their economic actions. It includes competition and regulation policy (Berg, Cassel and Hartwig 2007: 320; Welfens 2010: 516).

With process (or stabilization) policy, government takes on the role of an active agent in the economy by affecting aggregate supply or demand with the goal of full employment. Its timeframe is rather short-term (Berg, Cassel and Hartwig 2007: 320; Welfens 2010: 517 and 521).

Growth policy shares market policy's long-term orientation but follows the more specific goal of affecting the development of the economy's output potential. Growth policy strives to reduce barriers to the output potential's long-term growth and to take measures to augment it. In particular, it focuses on the sectoral and regional (or more generally, spatial) structure of the economy (Welfens 2010: 517).

Table 1 classifies the elementary fields of economic policy according to their timeframe and assigns them to the macro, meso, and micro levels of the economy (Esser, Hillebrand et al. 1996: 2-4 and 28-30; Peters 1996: 25-27; Wagner 2008; Rauch 2009: 187-189; Welfens 2010: 516-518; Benner 2012c).

Table 1: *Elementary fields of economic policy*

	Market policy	Process policy	Growth policy
Time frame	long-term	short and medium term	long term
Macroeconomic level	Design of macroeconomic aspects of the economic order	Monetary and fiscal policy; exchange rate policy if applicable	Design of the macroeconomic framework for economic growth (e.g. influencing the capital stock)
Mesoeconomic level	Design of the general framework for single industries (e.g. industries with specific regulation needs)	Interventions in single industries or concerning single regions to counter cyclical crises	Structural policy: industrial policy and regional structural policy
Microeconomic level	Design of microeconomic aspects of the economic order	Design of microeconomic aspects of stabilization policy (e.g. income policy)	Structural policy: industrial and regional structural policy; microeconomic incentives for long-term growth

Source: own work adapted from Benner (2012c: 72).

Cluster policy can be seen primarily as a part of structural policy. It thus belongs to the elementary field of growth policy. Given its focus on affecting both the sectoral and the spatial economic structure, it is part of the meso and micro levels of economic policy. Still, its effects can extend into other fields of economic policy, too, and vice versa (den Hertog, Bergman and Charles 2001: 412-413).

4 The intersection of industrial policy and regional structural policy¹

If cluster policy is a component of structural policy, its relationship to its main subdivisions, that is, to industrial policy and regional structural policy (Peters 1996: 13; Eckey 2005: 934), needs to be analyzed (Benner 2012c).

First, cluster policy can be seen as a part of regional structural policy because it aims at affecting the spatial structure of the economy. Regional structural policy focuses on the economic development of regions (Peters 1996: 13). However, for the purposes pursued here, this should be broadened into a more general spatial perspective. In this sense, “regional” structural policy does not solely aim at the economic development of “regions” (regardless of how exactly they are defined), but also of locations at the local level and other spatially defined entities.

Second, cluster policy is also a part of industrial policy (Bruch-Krumbein and Hochmuth 2000: 69-70; Kiese 2008d: 130). There is no clear definition of industrial policy in the literature to date but many partially conflicting definitions that leave a lot of questions unanswered (e.g. Conrad 1987: 4-5 and 20; von Einem 1991: 13; Krumbein 1991: 41; Eichhorn and Greiling 1995: 18; Brösse 1999: 1 and 12-15; Bruch-Krumbein and Hochmuth 2000: 59-60; Seitz 2000: 32-34; Aiginger 2007: 300-302 and 319-320; Meyer-Stamer 2009b: 10-12; Altenburg 2011: 4). For example, consensus has not been reached on whether industrial policy should cover only manufacturing or the industrial sector of the economy, or the economy as a whole.

¹/ Concerning industrial policy, this section and the following ones draw on reasoning from Benner (2012c; 2012d).

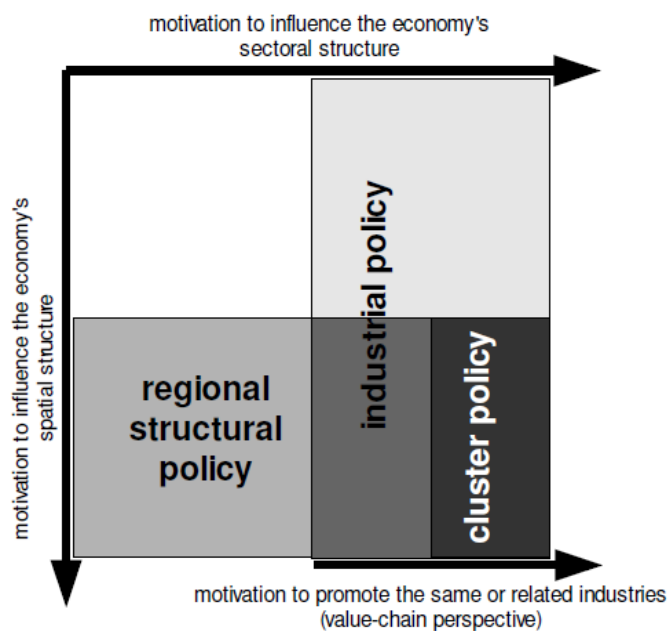
Following the broad understanding of industrial policy used in the U.S. literature (e.g. Rodrik 2004: 2), industrial policy is understood to cover the whole economy. Von Einem (1991: 13) defines industrial policy along its central motivation of affecting structural change of the economy in a way that changes the pure market results. Building on this definition and Benner (2012c: 76), industrial policy is understood as the focused use of measures of different partial policies. It consciously aims at influencing the change of the sectoral structure of the economy in the long term, either explicitly or implicitly, directly or indirectly. It pursues the goal of achieving results that cannot be expected at all, not in the same form, not to the same degree, or not at the same time exclusively under market influences.

It needs to be noted that almost all measures of economic policy, including those of other elementary fields, can affect the economic structure. Yet, these effects are not the primary motivation of other economic policy fields' measures. This is what distinguishes them from structural policy and why the working definition of industrial policy proposed here requires a conscious motivation to influence structural change, as otherwise it would not be possible to reasonably delimit industrial (or more generally, structural) policy vis-à-vis the rest of economic policy.

Figure 1 illustrates the location of cluster policy within the field of structural policy. Cluster policy can be found at the intersection of industrial policy and regional structural policy. It shares their motivations of affecting the sectoral and the spatial structure of the economy. However, cluster policy does not fill the whole space of this intersection. For example, the intersection may also contain policies that target businesses of a certain size (Peters 1996: 14).

Cluster policy represents only the part of the intersection that covers policies containing a specific motivation to promote the same or related industries as defined in the perspective of value chains. Then, the related industries are those within the same value chain, in similar value chains or in their environment. This value chain perspective ensures at least the possibility for linkages between cluster businesses (Benner 2012c). It is broader than a promotion of single companies or industries. Indeed, in some cases it may effectively target single industries in clusters which contain only one localized stage of a value chain. Even in these cases, the value chain perspective may then still lead to a focus on external linkages to other stages of the value chain. The value chain perspective is nonetheless narrower than a promotion of the whole economy (Porter 1998a: 248-250; Roelandt and den Hertog 1999a: 12; Ketels 2011: 9-10).

Figure 1: Cluster policy at the intersection of regional structural policy and industrial policy



Source: own work adapted from Benner (2012c: 83).

5 What exactly is cluster policy?

Various definitions of cluster policy have been proposed (e.g. Boekholt and Thuriaux 1999: 384; Bruch-Krumbein and Hochmuth 2000: 69-70; Raines 2000: 9-10; Nauwelaers 2001: 100; Hospers and Beugelsdijk 2002: 382; Fromhold-Eisebith and Eisebith 2005: 1252; Kiese 2008d: 130; Ketels 2011: 8). They tend to capture partial aspects of the policy area located at the intersection between industrial policy and regional structural policy. Drawing on some of these partial definitions, the cluster definition used by Benner (2009: 4; 2012c) and the definition of industrial policy provided above, cluster policy can be defined with the following characteristics (Benner 2012c: 85):

- Cluster policy is the focused use of measures of different partial policies. It consciously aims at influencing the change of the sectoral or spatial structure of the economy in the long term, either explicitly or implicitly, directly or indirectly.
- Cluster policy targets spatial agglomerations of businesses in the same or in related industries, particularly on the local and regional, but also at the national or supranational scale.
- The same or related industries are understood to be located in the same value chain, in similar value chains or in their environment.
- Cluster policy pursues a participatory basic perspective. Government and private agents (including businesses in particular) are expected to collaborate as equal partners to achieve its goals.
- Cluster policy uses instruments that focus on affecting the mechanisms identified on the basis of cluster theory.
- Cluster policy pursues the goal of achieving results that cannot be expected exclusively under market influences at all, not in the same form, not to the same degree, or not at the same time.

This definition, however, needs to be augmented with the goals that cluster policy is supposed to pursue. Furthermore, it does not in itself contain a judgment on the market conformity of cluster policy, as is indicated in the latter characteristic. This emphasizes the need to develop criteria for the market conformity of cluster policy.

6 Market conformity of cluster policy

The question of market conformity is the most salient goal conflict between cluster policy and other fields of economic policy. Market policy within a capitalist market economy demands that government activity should not unduly distort market processes. Government interventions into the market need to be justified. In essence, the goal of any government intervention should be to enhance, not to hamper economic efficiency.

This means that government intervention is justified if and when it can effectively reduce the efficiency-reducing effects of market failures (Ketels 2011: 8-10). Still, this is not a sufficient condition as expected benefits of government intervention must be weighed against the effects of possible government failure (Seitz 2000; Andersson, Schwaag Serger et al. 2004: 49-51; Hospers 2005: 453; Berg, Cassel and Hartwig 2007: 281-282; Kiese 2008c: 46-47; Meyer-Stamer 2009b: 23; Ketels 2011: 10). For the sake of efficiency, government should abstain from interventions that weaken the economy's long-term growth and welfare potential.

Given that cluster policy is a part of industrial policy, it can only conform to the system of a market economy insofar as industrial policy does. Industrial policy can have two broad orientations. Eichhorn and Greiling (1995: 18) distinguished traditional from strategic or newer industrial policy. Traditional industrial policy focuses on holding back

structural change while strategic or newer industrial policy aims at supporting industries that are deemed seminal by facilitating their growth. Technology policy is a central element of this industrial policy orientation. Wide parts of East Asian industrial policy can be regarded as variants of “new” industrial policy (or rather, policies) in the sense that it aimed at upgrading industries' competitiveness in the long term (e.g. Chang 2001; Hirono 2001; Kang 2001; Wong and Ng 2001).

While traditional industrial policy will generally not conform to the system of a market economy (Peters 1996: 188), government intervention under “new” industrial policy still needs to be justified. If industrial policy is about promoting the growth of dynamic industries, why should government intervene instead of letting these industries unfold freely? Thus, market failure should be a necessary but not sufficient (Berg, Cassel and Hartwig 2007: 281-282) condition for the use of this kind of industrial policy. Several criteria have to be fulfilled to justify it: A particular market failure must obstruct the industry to unfold its full growth potential (which must be examined before). Government intervention must be able to provide an effective and efficient remedy. And it must be applied in an effective and efficient way. These are strict requirements for the use of industrial policy. However, if one assumes – somewhat contrary to neoclassical economics – that market failure is rather the rule than the exception and that perfect markets are an idealized concept and rarely found in reality, industrial policy might still be applicable in many cases.

Consequently, cluster policy needs to be designed according to such a “new” industrial policy to fulfill the requirement of market conformity (Benner 2012c). Porter (1990) describes an example of a new industrial policy concept. His general theory of economic policy exceeds but includes cluster policy and is based on his “microeconomics of competitiveness” (Kiese 2008b: 59). The “industrial policy” Porter (1998a: 248-249) criticized is essentially traditional industrial policy. When he emphasized the need for policies that facilitate the upgrading of industries' competitiveness, he developed a new industrial policy concept. In contrast to the zero-sum view underlying traditional industrial policy, Porter's concept is based on the perspective of “a positive sum underlying view of competition, in which productivity improvements and trade expand the market and many locations prosper if they can become more productive and innovative” (Porter 1998a: 249).

In this sense, Porter (1998a) developed his notion of cluster policy. He demanded a “market test” to be performed before initiating a cluster policy, but did not provide detailed instructions of how such a market test should be designed. For example, the test could be interpreted according to whether private agents are willing to fund an institutionalized cluster initiative (Sternberg, Kiese and Schätzl 2004; 178; Zürker 2007; Benner 2012c).

7 Goals of cluster policy

As cluster policy is located at the intersection of industrial policy and regional structural policy and thus as a part of growth policy, it shares the goals of these fields. Specific goals of cluster policy may conflict with goals of other fields of economic policy.

At the highest level, the ultimate goal of each economic policy of a nation is, as Porter (1990: 6) argued, “to produce a high and rising standard of living for its citizens.” On a more technical basis, this can be translated into the goal of (allocative) efficiency (Haug 2004: 48). In the field of growth policy, relevant aspects of this goal are a high (and possibly rising) level of employment and an adequate rate of output growth (Seitz 2000: 162-167). Thus, these goals are also the ultimate objectives for cluster policy (Benner 2012c).

These two objectives of cluster policy, however, are not always consonant with each other. If cluster policy as a part of industrial policy is pursued along the lines of “traditional” industrial policy, conserving old economic structures may serve to maintain employment in declining or changing industries, but possibly at the price of not utilizing growth potentials in other, nascent or renewing industries. Conversely, cluster policy can be devised along the principles of “new” industrial policy and thus aim at industrial upgrading for the sake of facilitating future growth. According to Altenburg (2003), upgrading consists of a knowledge-based augmentation of value added that leads to higher factor

income. This may, however, conflict with the employment objective. For example, upgrading may entail shifting labor-intensive activities to locations that offer lower labor costs:

„Over time, less productive activities are internationalized to lower cost and improve access to foreign markets. As long as such internationalization results not from internal rigidities but from active pursuit of opportunities, this process makes the cluster more competitive“ (Porter 1998a, 242-243).

In the short and medium term, this can reduce employment at the cluster's location (Rehfeld 1994: 198-199; Porter 1998a: 247), while in the long term employment might increase because of the cluster's specialization in activities with higher value added and the increased competitiveness of its companies (Porter 1998a: 261; Benner 2012c).

8 A toolbox for cluster policy

This section introduces a toolbox that integrates insights from cluster theory and concurrently demonstrates ways for agents of cluster policy to design their own strategies. The discussion refers to clusters at the regional and local levels, but considers also agents on higher spatial scales insofar as they can influence these clusters.

From cluster mechanisms to cluster policy instruments

The basis of the toolbox consists of the mechanisms developed by Benner (2009; 2012c). These twelve mechanisms describe the drivers of the dynamics that can work within clusters. They are the vectors of cluster theory in the toolbox. Benner (2009; 2012c) lists the lines of reasoning derived from cluster theory behind each mechanism, as well as their empirical discussion. In addition, each mechanism can be attributed to one or several cluster dimensions (e.g. Bathelt 2004: 151-155; Bathelt and Dewald 2008; Bathelt and Glückler 2012: 260-263; Benner 2012c).

The mechanisms can work in varying degrees, depending on the spatial level. Table 2 lists the twelve cluster mechanisms and assesses their possible effectiveness on the supranational, national, regional, and local levels.

Table 2: *Mechanisms of cluster theory on spatial scales*

Mechanism	Supranational level	National level	Regional level	Local level
Recruitment of qualified new staff among alumni of higher education institutes	medium	Strong	strong	strong
Labor mobility among companies or between higher education or research institutes and companies	medium	Strong	strong	strong
Student work in companies (e.g. as interns or student trainees or through writing theses)	weak	Medium	strong	strong
Spinoff formation	weak	Medium	strong	strong
Availability of venture capital (including financing through angel investors)	weak	Medium	strong	strong
Cooperation between higher educa-	weak	Medium	strong	strong

tion or research institutes and companies				
Horizontal cooperation among companies (including cooperation in trade associations)	weak	Strong	strong	strong
Vertical cooperation among companies	weak	Medium	strong	strong
Intensive local competition	weak	Medium	strong	strong
Competition in the local social hierarchy	weak	Weak	strong	strong
Cafeteria effects	weak	Weak	medium	strong
Social networks	Weak	Medium	strong	strong

Source: own work adapted from Benner (2012c: 66-67).

To attain policy relevance, the mechanisms which incorporate insights of cluster theory must be linked to policy instruments. Therefore, the next step to build the toolbox is to assign instruments to each mechanism that can influence it. Drawing on Benner (2009; 2012a; 2012b; 2012c), Table 3 actualizes this assignment of instruments. Many of these instruments have already been proposed (e.g. Porter 1990; 1998a; 1998c; Saxenian 1994; Sternberg 1995; Rosenfeld 1997: 20-21; Altenburg and Meyer-Stamer 1999; Boekholt and Thuriaux 1999; Hellmer, Friese et al. 1999; Roelandt and den Hertog 1999b; Hilpert 2000; Raines 2000; Koschatzky 2001: 313-342; Taylor and Raines 2001, S. 11; European Commission 2002: 43-50; Tidelski 2002; Sölvell, Lindqvist and Ketels 2003; Andersson, Schwaag Serger et al. 2004; Haug 2004: 93-111; Cernavin 2005; Küpper and Röllinghoff 2005; Dewald 2006; Beckord 2007; Bathelt and Dewald 2008: 172-176; Brandt 2008a: 138-141; 2008b: 123-125; Feser 2008: 189-190; Jappe-Heinze, Baier and Kroll 2008: 16-17; Wimbauer 2008; Baranowski 2009; StMWIVT 2009: 9; Dobrinsky 2009; Heinze and Beck 2009; Mager and Röllinghoff 2009; Froy and Giguère 2010: 23). Evidently the following list of instruments is not exhaustive.

Table 3: *Instruments of cluster policy*

Mechanism	Instruments
Recruitment of qualified new staff among alumni of higher education institutes	<ul style="list-style-type: none"> ▪ Job fairs ▪ Direct matching between employers and qualified job-seekers ▪ Direct dialogue between companies and R&D/education institutions ▪ Public relations initiatives for the cluster ▪ Online job exchange ▪ Lobbying for measures of education and science policy (e.g. for locating R&D/education institutions within the cluster)
Labor mobility among companies or between higher education or research institutes and companies	<ul style="list-style-type: none"> ▪ Job fairs ▪ Direct matching between employers and qualified job-seekers ▪ Public relations initiatives for the cluster ▪ Online job exchange ▪ Lobbying for measures of education and science policy (e.g. for locating R&D/education institutions within the cluster)
Student work in companies (e.g. as interns or student trainees or through writing theses)	<ul style="list-style-type: none"> ▪ Job fairs ▪ Direct matching between employers and qualified job-seekers ▪ Direct dialogue between companies and R&D/education institutions ▪ Public relations initiatives for the cluster ▪ Online job and internship exchange ▪ Scholarships for theses and internships ▪ Lobbying for measures of education and science policy (e.g. for locating R&D/education institutions within the cluster)
Spinoff formation	<ul style="list-style-type: none"> ▪ Entrepreneurship or business plan competitions ▪ Foundation of technology centers or science parks ▪ Entrepreneurship seminars ▪ Consulting for (possible) entrepreneurs before and after the new business formation and information about support options ▪ Matching of entrepreneurs and experts ▪ Industry and technology-specific subsidies for new business formation ▪ Lobbying for measures of education and science policy (e.g. for locating R&D/education institutions within the cluster)
Availability of venture capital (including financing through angel investors)	<ul style="list-style-type: none"> ▪ Allocation of venture capital by venture capital funds ▪ Direct coaching for spinoffs by venture capital donors ▪ Development of technology centers or science parks into incubators through the offer of venture capital
Cooperation between higher education or research institutes and companies	<ul style="list-style-type: none"> ▪ Technology transfer departments of subsidiaries of universities ▪ Technology transfer specialists at university institutes or chairs ▪ Management of cooperation projects ▪ Direct matching of potential partners ▪ Congresses, seminars and other meetings as a means of initiating and maintaining contacts

	<ul style="list-style-type: none"> ▪ University classes for industry workers ▪ University training programs for industry workers ▪ Use of universities' or R&D institutions' infrastructure (e.g. laboratories or machines) by industry ▪ Financial support for collaboration (also through cluster competitions) ▪ Innovation vouchers ▪ Formation of associations or working groups encompassing industry and universities or R&D institutions ▪ Use of contacts to other associations or networks for trans-regional matching in the external cluster dimension ▪ Industry semesters of university teachers ▪ Collaboration in designing a cluster strategy in order to participate in a cluster competition ▪ Online cooperation database ▪ Creation of a cooperative climate by building a common cluster identity (e.g. through public relations initiatives) ▪ Lobbying for measures of education and science policy (e.g. for locating R&D/education institutions within the cluster)
Horizontal cooperation among companies (including cooperation in trade associations)	<ul style="list-style-type: none"> ▪ Management of cooperation projects ▪ Direct matching of potential partners ▪ Congresses, company visits, seminars and other meetings as a means of initiating and maintaining contacts ▪ Use of leading companies' infrastructure (e.g. laboratories or machines) by other companies ▪ Financial support for collaboration (also through cluster competitions) ▪ Formation of industry associations or working groups ▪ Use of contacts to other associations or networks for trans-regional matching in the external cluster dimension ▪ Collaboration in designing a cluster strategy in order to participate in a cluster competition ▪ Use of trade fair participation programs for trans-regional or international matching in the external cluster dimension ▪ Use of delegation trips for trans-regional or international matching in the external cluster dimension ▪ Online cooperation database ▪ Creation of a cooperative climate by building a common cluster identity (e.g. through public relations initiatives) ▪ Focused investment promotion towards external companies, including through focused allocation of subsidies ▪ Use of public relations initiatives for trans-regional matching in the external cluster dimension
Vertical cooperation among companies	<ul style="list-style-type: none"> ▪ Management of cooperation projects ▪ Direct matching of potential partners ▪ Congresses, company visits, seminars and other meetings as a means of initiating and maintaining contacts ▪ Use of leading companies' infrastructure (e.g. laboratories or machines) by other companies ▪ Financial support for collaboration (also through cluster competitions) ▪ Formation of associations or working groups encompassing various industries ▪ Use of contacts to other associations or networks for trans-regional matching in

	<p>the external cluster dimension</p> <ul style="list-style-type: none"> ▪ Collaboration in designing a cluster strategy in order to participate in a cluster competition ▪ Use of trade fair participation programs for trans-regional or international matching in the external cluster dimension ▪ Use of delegation trips for trans-regional or international matching in the external cluster dimension ▪ Online cooperation database ▪ Creation of a cooperative climate by building a common cluster identity (e.g. through public relations initiatives) ▪ Focused investment promotion towards external companies, including through focused allocation of subsidies ▪ Use of public relations initiatives for trans-regional matching in the external cluster dimension
Intensive local competition	<ul style="list-style-type: none"> ▪ Sophisticated public procurement ▪ Implementation of common parameters for competition through standard-setting and certification ▪ Focused investment promotion towards external competitors, including through focused allocation of subsidies
Competition in the local social hierarchy	<ul style="list-style-type: none"> ▪ Information about cluster personalities (e.g. in newsletters and publications) ▪ Allocation of awards
Cafeteria effects	<ul style="list-style-type: none"> ▪ Foundation of technology centers of science parks ▪ Use of universities' or R&D institutions' infrastructure (e.g. laboratories or machines) by industry
Social networks	<ul style="list-style-type: none"> ▪ Congresses, company visits, seminars and other meetings as a means of initiating and maintaining contacts ▪ Use of well-connected personalities as a means of initiating and maintaining contacts ▪ Industry semesters of university teachers ▪ Collaboration in designing a cluster strategy in order to participate in a cluster competition

Source: own work adapted from Benner (2012c: 156-159).

Cluster policy agents

After the establishment of instruments of cluster policy, agents who can use these instruments must be identified. For the purposes of this article, possibly relevant agents are classified in the following six major groups (Benner 2012a; 2012b; 2012c):

- Businesses:

This refers to companies that play a more active role in the promotion of the cluster. To qualify as an agent of cluster *policy*, a company needs to play a more active role than simply being its passive consumer;

- Associations:

These can essentially be trade associations that cover only a specific industry, or business associations that are open to companies from a variety of industries and possibly to other agents like universities and research institutions. Note that associations themselves are agents while their formation can be an instrument employed by other agents;

- Government agents:

This group includes government agents on all political levels, including municipal authorities. Independent agencies that fulfill public tasks with a mandate aiming at the common good are also part of this group. Government agents on the regional and the local level may often initiate and design a cluster policy. Especially in its early stages, agents like regional government departments of industry or municipal departments for business development can take the driver's seat of cluster promotion efforts (Enright 2000: 313-314), at least until an institutionalized cluster initiative is formed for this purpose or until a networking agent closer to business (e.g. an association or a chamber of commerce) takes the lead;

- Universities, educational and training institutions, and research institutions:

Note that research institutions in the field of cluster policy can play a role in the design and implementation of the cluster promotion strategy itself, for example, in consulting the design and implementation phases. Other research institutions can contribute to the use of specific cluster policy instruments if they are specialized in a field of knowledge relevant to the cluster's industries, its businesses' markets, or the technologies they employ;

- Cluster initiatives:

This group contains formalized networks or "institutions for collaboration" (Sölvell, Lindqvist and Ketels 2003). If these institutions become established, they will often sit in the driver's seat of further cluster promotion efforts. Their formation can be a meta instrument of cluster policy employed by other agents. They may be funded publicly or privately (i.e., by constituent companies and other non-government agents) or jointly. Over time, a shift from public toward private funding may be desirable. This effort requires, however, a certain degree of responsiveness to companies' needs. Thus, a bottom-up design might be conducive to such a shift (Sölvell, Lindqvist and Ketels 2003);

- Other agents:

Note that trade union branches may also participate in cluster policy. They can contribute to developing new economic perspectives for regions, especially in deindustrialized or deindustrializing areas (e.g. Kiese 2008c: 186-187).

Table 4 lists agents most likely to be relevant on the supranational, national, regional, and local levels, although again this list can by no means be exhaustive.²

²/. For a detailed description of the classification of agents on the four spatial scales, cf. Benner (2012b; 2012c).

Table 4: *Agents of cluster policy*

Mechanism	Supranational level	National level	Regional level	Local level
Businesses	<ul style="list-style-type: none"> ▪ supranational leading companies ▪ other supranational companies 	<ul style="list-style-type: none"> ▪ national leading companies ▪ other national companies 	<ul style="list-style-type: none"> ▪ regional leading companies ▪ other regional companies (including small and medium sized enterprises) ▪ regional branches of businesses head quartered in other locations 	<ul style="list-style-type: none"> ▪ local leading companies ▪ other local companies (including small and medium enterprises) ▪ local branches of businesses head quartered in other locations
Associations	<ul style="list-style-type: none"> ▪ supranational federations of associations 	<ul style="list-style-type: none"> ▪ national associations or federations of associations ▪ national private-law chambers of commerce 	<ul style="list-style-type: none"> ▪ regional trade associations ▪ regional business associations ▪ regional branches of national associations ▪ regional private-law chambers of commerce 	<ul style="list-style-type: none"> ▪ local trade associations ▪ local business associations ▪ local branches of national or regional associations ▪ local branches of regional private-law chambers of commerce
Government agents	<ul style="list-style-type: none"> ▪ supranational government agencies (e.g. EU commission) and affiliate agencies and institutions ▪ supranational public banks (including supranational public venture capital companies) 	<ul style="list-style-type: none"> ▪ national ministry of science ▪ national ministry of industry ▪ national ministry of technology ▪ national investment promotion agency ▪ national export promotion agency ▪ national public banks (including national public venture capital companies) 	<ul style="list-style-type: none"> ▪ office of the head of regional government ▪ regional government department of science ▪ regional government department of industry ▪ regional government department of technology ▪ other regional government departments, if applicable ▪ regional technology transfer agency ▪ regional investment promotion agency ▪ regional export promotion agency ▪ regional public science or economic development foundations 	<ul style="list-style-type: none"> ▪ municipal departments for business development in towns and villages ▪ municipal departments for business development in counties or districts ▪ joint departments for business development of several municipalities ▪ local technology transfer agency ▪ local public science or economic development foundations ▪ local public banks (including local public venture capital companies) ▪ local branches of public-law chambers of commerce ▪ local job center branches

			<ul style="list-style-type: none"> ▪ regional public banks (including regional public venture capital companies) ▪ regional public-law chambers of commerce 	
Universities, educational and training institutions, and research institutions	<ul style="list-style-type: none"> ▪ supranational research institutions in the field of cluster policy ▪ supranational research institutions with knowledge relevant to the cluster ▪ supranational universities (including their schools, chairs and institutes) ▪ other supranational educational and training institutions 	<ul style="list-style-type: none"> ▪ national research institutions in the field of cluster policy ▪ national research institutions with knowledge relevant to the cluster ▪ national universities (including their schools, chairs and institutes) ▪ other national educational and training institutions 	<ul style="list-style-type: none"> ▪ regional research institutions in the field of cluster policy ▪ regional research institutions with knowledge relevant to the cluster ▪ regional universities (including their schools, chairs and institutes) ▪ other regional educational and training institutions 	<ul style="list-style-type: none"> ▪ local research institutions in the field of cluster policy ▪ local research institutions with knowledge relevant to the cluster ▪ local universities (including their schools, chairs and institutes) ▪ other local educational and training institutions
Cluster initiatives			<ul style="list-style-type: none"> ▪ regional cluster management 	<ul style="list-style-type: none"> ▪ local cluster management
Other agents	<ul style="list-style-type: none"> ▪ supranational consultants ▪ supranational private banks ▪ specialized supranational venture capital companies 	<ul style="list-style-type: none"> ▪ national consultants ▪ national private banks ▪ specialized national venture capital companies 	<ul style="list-style-type: none"> ▪ regional consultants ▪ regional private banks (including regional public venture capital companies) ▪ specialized regional venture capital companies (including angel investors) ▪ regional branches of trade unions 	<ul style="list-style-type: none"> ▪ local consultants ▪ local private banks (including local public venture capital companies) ▪ local regional venture capital companies (including angel investors) ▪ local branches of trade unions

Source: own work adapted from Benner (2012c: 172-173).

Completing the toolbox: mechanisms, instruments, agents, and contributions

The toolbox is completed by establishing a matrix between instruments and agents. In this way, agents are assigned their possible contributions to the use of an instrument. Thus, various agents can cooperate in using a single instrument. In essence, such a matrix forms a database that links mechanisms, instruments, agents, and their contributions. Contributions can be, for example, financial support for an instrument, organization services (e.g. organizing a conference), and approaching possible stakeholders. Therefore, various contributions by different agents can be combined into the use of an instrument.³

Figure 2 presents a schematic display of the toolbox, its underlying theoretical model and its use in the design of a particular cluster promotion strategy.⁴ The matrix that combines instruments and agents by proposing their possible contributions is represented in the right area of the table. Note that the model contains two analytical levels: On the cluster level, the particular cluster to be promoted is analyzed and insights from cluster theory are used. On the cluster policy level, ways to exert influence on the cluster by means of cluster policy are elaborated and suggested.

The model contains three barriers. According to the empirical barrier, conclusions are drawn from the empirical literature in the field of cluster theory (Benner 2009). This barrier refers to cluster mechanisms. It requires policymakers to assign priorities to mechanisms to be influenced according to their empirical validation. This assignment is important for policy design because under the presence of resource constraints, concentrating on these evidence-based mechanisms makes sense.

The second barrier is the policy barrier. It addresses the degree to which a cluster mechanism can be influenced by policy. The barrier examines whether this can be performed directly or more indirectly and whether by cluster policy in a narrow sense or by other fields of economic policy. The policy barrier calls for a certain caution. Cluster dynamics may go their own ways without necessarily responding to political impulses in the way intended by policymakers (or at all).

The final barrier weighs the costs and benefits of cluster policy interventions. Before using a cluster policy instrument, policymakers need to assure that this intervention and its individual design and implementation do not distort the market disproportionately, and that benefits outweigh the costs. If resources are constrained, the conclusions drawn from this analysis can be used to prioritize instruments and to design and implement them in the most favorable way. Instruments with the most favorable cost-benefit ratio should then take precedence over others or should be used first. Another benefit of an instrument can also be the multiplicity of its effects. Some instruments (and hence contributions to their use) can affect more than one mechanism. This multicausality can be used to multiply the effects of the use of limited resources in designing a potent cluster policy.

When using the toolbox, policymakers are advised to follow this procedure:

- 1 The first step must always be a profound analysis of the regional or local economic structure with an open outcome (e.g. Sautter 2004: 68; Küpper and Röllinghoff 2005; Sternberg 2005: 135; Beckord 2007; Zürker 2007: 268-272; Brandt 2008b: 121; Fromhold-Eisebith and Eisebith 2008: 90; Kiese

³/. For such a complete matrix in the institutional setting of Germany, cf. Benner (2012a; 2012b).

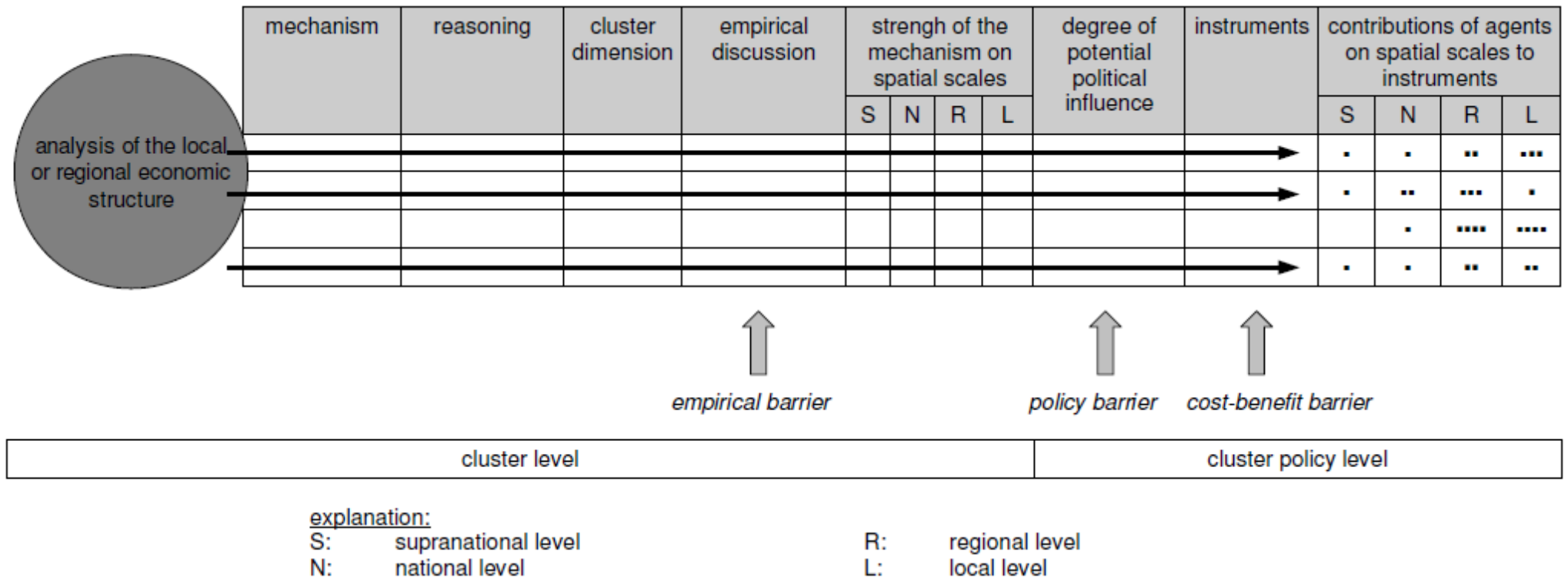
⁴/. For a detailed description of the model including its barriers and use, cf. Benner (2012c).

2008c). The existence and extent of at least some cluster potentials must be established. In the absence of cluster potentials, cluster policy would not be the method of choice because of the lack of market conformity and its meager chances for success (Castells and Hall 1994: 7-8; Tichy 1998: 232; Taylor and Raines 2001: 32; Rehfeld 2006: 253; Zürker 2007: 268; Feser 2008: 197; Wrobel and Kiese 2009: 164). Depending on the cluster's industry and its structure, mechanisms that can be or become effective in the cluster must be selected. Other mechanisms that cannot work at all because of the industry's or cluster's character should be discarded from further analysis.

- 2 As part of the analysis of the regional or local economic structure, observable mechanisms in the cluster need to be identified, as well as the degree to which they can be observed. The identified mechanisms need to be compared with the possible mechanisms selected in the first step. If fewer mechanisms are observable than could be salient, or if mechanisms are weaker than they could be, the design and implementation of a cluster promotion strategy can be justified. This is a practical approximation of the theoretical requirement that cluster policy interventions presuppose some kind of market failure.
- 3 In the next stage, the model's three barriers have to be addressed. In this process, several instruments will often be discarded or be deferred for later use due to resource constraints.
- 4 Contributions to the remaining instruments that have survived the third stage can be derived from the matrix. However, possible contributions can and will often have to be disregarded because not all agents listed in Table 4 (or other, substituting agents) are present in the particular cluster or because some of the agents are not able or do not want to participate in the implementation of the cluster promotion strategy.

Clearly, the causal relationships that underlie the model and hence the toolbox are not necessary but contingent ones (Bathelt and Glückler 2003; 2012: 47-49). Thus, there can never be any guarantee that the use of a particular instrument will have the intended effect on a particular mechanism and thus on an individual cluster.

Figure 2: Model of cluster policy for the regional and local level



Source: own work adapted from Benner (2012c: 180).

9 The toolbox and the theory

This toolbox can generally be applied in any institutional and economic context (that is, if the cluster potentials are present). It is usable both in developed and in developing countries, including transformation economies. However, the toolbox might need to be adapted to a particular context because of the fact that the list of instruments and agents can never be complete (and that new mechanisms might also be discovered over time).

The toolbox is also not confined to certain industries. It can be used for developing cluster promotion strategies in industries such as agriculture, manufacturing, or services, and also for value chains that cross the borders between sectors. In fact, this latter case often tends to be the focus of cluster policy because it focuses on linkages between industries and sectors (Ketels 2011: 9-10). Specific characteristics concerning the cluster's industry or industries may require an adjustment of the toolbox, because of the context of the national or regional economy. This requirement is especially true for industries with a high degree of idiosyncrasy (e.g. tourism, in part due to fact that the touristic product, i.e., the destination, is a public good).

Various refinements are possible for the agents of cluster policy. For example, political agents such as parliaments are not separately listed in Table 4. Insofar as they are involved in cluster policy decision making, the agents are seen for the purposes of this paper as parts of the respective government agent (e.g. a ministry). Hence, no distinction is made in this article between political (e.g. a minister) and administrative (e.g. civil servants) decision makers within a government institution. Given that these decision makers might exhibit differing rationalities (Kiese 2008c; 2008d), this distinction is worth considering. However, this distinction is a notion of New Political Economy that is beyond the scope of this article. To focus on cluster *policy*, these aspects of cluster *politics* need to be disregarded here, although both parts – the normative strand pursued here and the positive strand examined by approaches using analytical tools of New Political Economy (Kiese 2008c; 2008d) – need to be integrated in a comprehensive theory of cluster policy (Benner 2012c).

10 Conclusions for cluster policy-making

The previous discussion leads to several conclusions that should be followed in designing and implementing strategies of cluster promotion (Benner 2012c: 214-222):

- 1 The impact of cluster policy should not be overestimated. It can only provide conditions for enterprises to be successful in their respective markets. Thus, it should concentrate on the fields of action where it can effectively support their strategies.
- 2 Cluster policy is not everything. It is not a comprehensive economic policy and can not replace the latter (Enright 2000: 326). Specifically, it should not be seen as an easy way out of macroeconomic reforms. It can be part of a comprehensive economic policy and presupposes a sound macroeconomic environment to achieve its full potential. Without it, it may still sometimes help develop some seeds for entrepreneurial success on the regional and local levels, but its potential to reach its goals remains limited in these cases (Bathelt and Dewald 2008: 168; Rehfeld 2009: 179).

- 3 Cluster policy is not always the measure of choice. It will not be a suitable device for every location. There have to be at least some cluster potentials. Yet, full-blown clusters are not a necessary requirement for some degree of cluster policy. A selective use of cluster policy tools offers a scope of action for many locations if they can be directed at (at least nascent) cluster potentials. If such potentials do not exist, other approaches of economic and regional development are more likely to be the concepts of choice (den Hertog, Bergman and Charles 2001: 409; Enright 2003: 122; Kiese 2008c: 210-211).
- 4 Cluster policy is not a dichotomy, but a continuum. It should not focus on whether there is a full-blown cluster in a region, but whether there are potentials for the further development of clustering. Some instruments of cluster policy can be used beneficially by building on strengths in the economic structure even below the threshold of a full cluster (Raines 2000:19-20, 32; den Hertog, Bergman and Charles 2001: 409; Feser 2008: 188-193).
- 5 Cluster policy is not a cooking recipe (e.g. Moore and Davis 2004: 9), but a toolbox. There is no "one size fits all" or single best-practice way of cluster policy (Enright 2000: 327; den Hertog, Bergman and Charles 2001; Hospers and Beugelsdijk 2002: 396-397; Hospers 2005: 455; Schätzl and Kiese 2008: 269-270; Meyer-Stamer 2009a: 33; Wrobel 2009: 99 f.; Wrobel and Kiese 2009: 170-171, 176; Li 2011: 16-17). Cluster policies have to be tailored to each individual case.
- 6 Cluster policy presupposes an open-minded analysis of the respective location's economic structure (Kiese 2008c: 209). Potentials must be identified. Deficient mechanisms of clustering that prevent their full independent development must be examined because they may act as an indication for market failure that might be cured by cluster policy (provided cluster policy contains effective measures to cure them and to use the measures in an advantageous cost-benefit ratio).
- 7 Cluster policy is more than networking. Building and supporting networks and cooperation can be important, but clusters may also work successfully in other ways (Kiese 2008a: 290; 2008c: 201; Sölvell 2008: 91-92; Meyer-Stamer 2009a: 30-31; 2009b: 41). Specifically, intense competition (Porter 1990; 1998b) can be a strong driver of some dynamic clusters. Still, networks may also act to boost other cluster mechanisms. For example, networking might lead to a shared vision of competitive success of the cluster's enterprises based on a combination of cooperation and competition. Thus, it might be easier to build acceptance for the benefits of competition between the cluster's entrepreneurs in spite of working together in areas of shared interest. In addition, networking might enhance the information flow within the cluster and create incentives for dynamic competition among its enterprises.
- 8 Networking is primarily about people, not about formalized structure. Not every cluster needs an institutionalized network. Establishing formalized organizations for networking and coordination can make sense in many cases, but some clusters can work successfully using only informal contact and coordination.
- 9 Cluster policy guarantees neither growth nor employment. Expectations should be realistic to avoid frustration (Kiese 2008a). It can provide policy instruments that may contribute to growth and employment goals, but it is no panacea. Its degree of success differs from case to case.
- 10 Cluster policy is a continuous process. Promoting one or two clusters in a region might not achieve any significant economic impact, and if it does, the danger of overdependence on a single industry looms. Cluster policy may be used as a means to achieve specialization in diversification. Thus, after the successful promotion of one cluster, public agents should hand over the principal responsibility to

private agents and move on to promote the next cluster. Clustering potentials might occasionally arise anew because of entrepreneurial dynamism. General economic policy (including promoting creativity and entrepreneurship) might provide a hotbed for new potentials to blossom. Conclusions drawn from approaches like Jacobs' (1969; 1984) diversity hypothesis or Florida's (2004) creative capital theory can complement cluster policy at this stage (Koschatzky 2001). Analyzing the location's economic structure then becomes a regular process. To a certain degree, such a continuous identification and promotion of newly arising clusters, combined with a general economic environment that enables their emergence, might even contribute to regional resilience (e.g. Bristow 2010; Dawley, Pike and Tomaney 2010; Simmie and Martin 2010; Martin 2012).⁵

- 11 Cluster policy should not only look into clusters, but also between them. Promising new trajectories might emerge at the borders of an industry or in converging ones. Cluster policy should not lead to compartmentalized thinking that ignores these new potentials. Here, concepts like those summarized by Sölvell (2008: 11-13) under the label of the creative region might help.
- 12 The possibilities of cluster policy are constrained, but these constraints contain chances. Measures of cluster policy may work in an indirect and contingent way (Bathelt and Glückler 2003; 2012: 47-49) but also in a multiple way.⁶ Even if employed according to theory, instruments of cluster policy do not necessarily cause the desired effects, and even if they do, the quantitative results cannot reliably be predicted at the outset. As the toolbox shows, certain instruments can clearly affect several cluster mechanisms and thus lead to a wide array of results. This means that even if measures of cluster policy do not produce expected outcomes, they may still yield other effects that were previously not planned. Some of these effects might be beneficial to the cluster and offset possibly discouraging outcomes on other mechanisms. Moreover, unintended beneficial side-effects on other industries can also be induced. These side-effects do not render a carefully drafted strategy of cluster promotion useless. On the contrary, by identifying the contingent relationships of the toolbox, the selection of instruments that can have particularly broad effects integrates the chances of multicausality into the strategy.

11 Cluster policy as a panacea?

As the conclusions drawn above demonstrate, cluster policy should not be seen as a panacea for economic development, neither for industrialized nor for developing countries. In particular, the warning that cluster policy is no substitute for a comprehensive economic policy that also includes a solid macroeconomic framework should be considered (Enright 2003: 122).

Furthermore, cluster policy should be embedded into the guidelines of a modern industrial policy that aims at upgrading competitiveness instead of conserving traditional structures. Such an industrial policy in the sense of Porter (1990) requires more than cluster policy, including some hard political choices, for example, in policies that foster intense competition and sophisticated environmental regulation.

Finally, even if cluster policy defined as a continued process will attenuate the danger of overdependence of regions on some industries and technological trajectories, it is important not to forget the need for the region

⁵/. Continually analyzing existing and newly emerging cluster potentials can be seen as a way to discover current and new technological trajectories. This can pose a solution to the difficulty of innovation policy to monitor technological development that Altenburg (2003) describes.

⁶/. I am grateful to Johannes Glückler for highlighting this aspect.

to adapt to new technological and economic trends outside of clusters. While convergence between clusters and openness of clusters to the outside world is one point advanced in this article, aspects of regional resilience (e.g. Bristow 2010; Dawley, Pike and Tomaney 2010; Simmie and Martin 2010; Martin 2012) should not be ignored.

Cluster policy is not a single-course menu, and maybe in many situations not even the main course. Yet, if designed appropriately it can be an integral and tasty course in the menu of economic policy.

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