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The cluster concept as a multi-dimensional thematic field: Methodological and substantive perspectives

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1 Introduction

Beginning with Porter's seminal publication on national competitiveness (Porter 1990) and increasingly since his regionalized concept model (Porter 1998) was taken up by other authors during the late 1990s (Dybe/Kujath 2000; Rehfeld 1999; Schamp 2000), the cluster concept has gained unprecedented popularity in science, industry and above all in technology, innovation and economic policy {Malmberg, 2006 2527 /id /ft ": 50"}. In general, this trend appears understandable, as in the context of the globalization debate and the crisis in Fordist mass production, Porter and other proponents of the regional version of the cluster concept, identified exactly those issues and challenges of which the business world and policy makers were acutely aware and that they needed to address to adapt to the increasing cross-border networkedness of markets with new promotion and development perspectives ((Thomi/Sternberg 2008). As Ketels and Memedovic (2008) have stressed, the growing interest in the significance of cross-company interactions that has emerged in the course of the last 15-20 years is particularly due to (re-)configurations of global value-added chains within regions and beyond. Apart from picking up policy-related and "business-friendly" issues, Martin and Sunley (2003) point out that the reason for the cluster concept's triumphal progress may just as well lie in its fundamental openness for different interpretations, respectively its adaptability to various regional contexts.

The understanding of what is meant by a cluster and which goals cluster policy pursues differs widely across regional promotion and business support programmes as well as between different strategies for regional innovation policy (cf. Kiese 2008b). Whereas early cluster policy activities were at least in part aiming at a 'direct implementation' of the new academic concept, it soon became clear that a further specification of concrete target systems was needed to develop actual support programmes. As a result, it can increasingly be observed that the political adaptation and/or implementation of cluster related programmes and strategies have conceptionally developed beyond their academic basis or at least differentiated the original cluster approach (Kiese 2007).

In addition to the conceptional complexity now found among different applications and implementations of the cluster concept, e.g. with regard to different aims, measures and instruments of various cluster policies, an equally wide range of approaches exist to identify clusters as well as to measure their dynamics and their contribution towards regional and national competitiveness from an analytical perspective. As in the case of political implementation, a generally accepted approach or methodology to 'measure clusters' does not exist (Martin/Sunley 2003). With the aim of quantifying the diverse dimensions of clusters, different researchers have suggested and used a large number of different statistical measuring methods, such as concentration measurements based

on employment data and patent applications, network and social structure analyses as well as input-output analyses.

Against the background of the multi-dimensionality of the cluster concept as well as the diverse conceptualizations and implementations of cluster policies, this article begins by re-stating and re-considering the key assumptions of cluster theory; in a further step it will seek to systematize the existing diversity of cluster policies and finally, to put them in perspective by using existing methodology to identify and determine clusters. In this way, a connection shall be established between the manifold approaches to measuring clusters and cluster potentials with diverse policy initiatives promoting them – which are currently developed in separation. Hence, the main aim of this paper is to contribute towards enhancing adaptive measuring techniques designed to meet specific political requirements.

2 Clusters as an economic phenomenon

2.1 Genesis and development of clusters

Even if the term cluster is presently experiencing a certain topicality in academic and innovation policy discussions, the basic phenomenon of the spatial concentration of economic activities underlying the cluster concept is anything but new (cf. Porter 1998). As early as in the late 19th century, Alfred Marshall observed and analyzed processes of spatial concentration in e.g. the knife industry or woolen goods manufacturing in the form of regional production networks or industrial districts of small and medium-sized enterprises (Marshall 1890). Research on spatially concentrated production systems experienced a renaissance in the 1980s (with the coining of the terms "territorial production systems", "Neo-Marshallian nodes", new industrial spaces) as well as, since the beginning of the 1990s, in the expansion of the original concept by approaches explaining regional technological developments and innovation activities (Cooke 1992). The abundance of concepts presented by socio- and innovation-economic research (industrial and technology districts, technopolis, regional innovative milieus, learning regions, high-tech regions, see Moulaert/Sekia 2003) led to a situation where a clear distinction of the manifold concepts became increasingly impossible. Despite different objects of investigation and dissimilar research objectives many studies emphasized the similar causal relationships and offered strongly related explanatory approaches under different labels, a fact that already lamented in the 1990s (Markusen 1999).

Against this background, the academic cluster concept was launched at a time when a basic familiarity with its basic tenets already existed, while its clear and straightforward

presentation still offered a unique selling point over other concepts. By emphasizing the spatial concentration of associated companies, specialized suppliers, service providers as well as firms from related industries and affiliated institutions, for examples, Porter builds his cluster definition (Porter 1998) on existing knowledge on the structural characteristics of spatially concentrated production systems, which had been extensively analyzed in regional sciences since the 1950s (Isard 1956). Beyond this, however, he adds the original idea of using this structural analysis to explain the competitiveness of nations and regions. Arguably, the core statement of the cluster concept thus is that competitiveness is ultimately generated in individual enterprises, but cannot be simply reduced to the sum and positioning of efficient single companies in the world economy. According to Porter (1990), the determinants of competitiveness are formed of a complex system of factor conditions (production factors which are required to manufacture a certain product), enterprise characteristics (strategies, organizational structures), demand conditions and related and supporting industries. By emphasizing the interplay of these mutually dependent levels, Porter underlines that the competitiveness of firms is the result of complex interactions and, in this sense, has a systemic character (Messner 1995). Beyond the abstract discussions by economists of the advantages of agglomerations (Isard 1956), Porters main contribution was – from a management perspective – to explain how the process of clustering industries and the geographical proximity of participating actors plays a concrete role at the corporate level. Moreover, he elaborated that and how agglomeration advantages as well as the mutually reinforced development of local factor and demand conditions facilitate an increase of corporate competitiveness beyond that attainable through own strength – which has made the concept particularly attractive to practitioners from the beginning.

As outlined above, cluster effects or cluster advantages are thus directly correlated to agglomeration effects and often equated with them (cf. Boschma/Wenting 2007; Malmberg/Maskell 2002). In the continuation of the debate initiated by Marshall (1890) and Isard (1956), the advantages of spatial proximity in utilizing existing resources, knowledge stocks, information sources, qualified workers, technologies and capital are usually referred to as (positive) 'agglomeration effects' or 'agglomeration advantages'. According to Schamp (2002), it is in particular the external economies of scale associated with agglomeration advantages which play an outstanding role in the development of local production systems and clusters. In other words, the above average industrial and/or sectoral specialization in clusters results in low transactions costs which are of managerial relevance for enterprises:

1. Due to the spatial concentration of enterprises and institutions of a value-added chain, and efficient division of labour forms as well as collaborations in selected fields can be established – which leads to a minimisation of transaction costs.

2. Information and knowledge are more easily, efficiently and rapidly exchanged in regional industry concentrations; an innovative "atmosphere" emerges in which knowledge diffuses rapidly via "spillover effects" (Saxenian 1994). For this reason high-performing and competitive clusters are simultaneously the most innovative: in these places, the circulation and adaptation (contextualization) of knowledge can take place via informal networks, market relations or the mobility of human capital and facilitates fast and permanent innovation as well as increases in productivity.
3. In the course of time, a cluster-specific material and immaterial infrastructure emerges, either jointly created by firms active in the cluster and other stakeholders (e.g. joint external representation, set up and operation of joint research institutions, labs, and technical infrastructures) or put in place as part of political strategies (e.g. specialized research and development institutes, cluster-oriented education and training systems, cluster offices).
4. Development of a highly qualified labour market which provides the knowledge and skills required by the cluster companies (Huber 2010). For firms in the cluster, this 'critical mass' of specialized potential employees, competences and knowledge is advantageous – not least with a view to supra-regional competition (Enright 2003).

The emergence and development of a cluster can only be inadequately presented in a generalizable model due to the complexity of the influencing factors that in addition tend to differ substantially between industries (Enright 2003). In general terms, Henn (2008) traces the emergence of spatial firm concentrations to a certain sector or technology field to three fundamental processes:

- Company start-ups: new firms or generally an "entrepreneurial environment" (Stahlecker 2006) are regarded as a central element in the emergence of regional clusters (Feldman/Francis 2006; Menzel/Fornahl 2005). In particular, many firms in technology or research-driven clusters tend to start-up in spatial proximity to a university or other research institutions, from which their founders originate and to which they maintain close contact ('spin-offs'). In addition to the immediate increase in employment caused by these start-ups, Henn (2008) points out that the market entrance of new, innovative enterprises in those industries on which the cluster is focused changes institutional environment in favour of the cluster.
- Location and relocation: besides the start-up of new enterprises, existing firms from outside the cluster may decide to locate activities in the cluster or relocate those that were formerly located outside of it. Thus, they can play an important role in cluster formation (cf. Ketels 2004). One major pull-factor for the location and relocation of activities is the institutional infrastructure that develops over time (Henn 2008). Due to their often significant size, relocated industry activities can positively influence the growth of a cluster and the generation of the decisive "critical mass" of firms with a view to intrinsically dynamic, respectively self-reinforcing processes. Furthermore,

Tichy (2001) emphasizes the increase in "variety and vitality" of a cluster which may be prompted by the relocation of external enterprises and which may help to reduce the danger of structural and technological "lock-ins".

- Entrepreneurial learning processes: based on the utilization of external expertise (e.g. of a technological and innovation-related nature, know-how and certain, often regionally embedded skills) inter-firm cooperations or collaborations with regional research institutions can be formed. These can be cases of pre-competitive co-operation (under certain circumstances, even with competitors), co-operative research and development, joint research projects, basic research or licensing, strategic partnerships etc.) (Henn 2008). Over time, this deepening division of labour can serve to establish greater "technological proximity" among the firms of the cluster (Specht/Mieke 2003) and ultimately lead to "technological convergence". In this regard, co-operative, corporate learning and the associated further development of industry-, technology- or innovation-related competences at the different levels in the cluster can be regarded as one of the causal drivers of the self-reinforcing dynamic in the cluster.

Taking an evolutionary perspective on regional and industrial development paths, we will in the following elaborate on the evolutionary-processual perspective of the Californian School of industrial location and growth processes (Scott 1988; Storper/Walker 1989). Basically, they argue that the location, relocation and start-up decisions of enterprises and plants are not the result of given location conditions, but that companies can and will create their own environment and location conditions themselves. Hence, they conclude that a firm's environment represents the result of its own economic behaviour[1]. For rapidly expanding manufacturing industries, certain 'windows of locational opportunity' (cf. Boschma 1997) exist in the so-called *localization phase*. Having settled in a region, the first pioneering firms of an industry are those that pose completely new requirements of their socio-economic and technological environment in the form of e.g. a differently qualified work force, new specialised suppliers and service providers, in fact of their entire institutional environment (Mossig 2008). During this stage, therefore, no other location can compete in terms of a more favourable environment – as the environment specifically adapted for this type of cluster is only just being created in a number of pioneering locations. In line with earlier research, Mossig (2000) points out that it is ultimately due to coincidences, individual decisions of entrepreneurial personalities, as well as singular political or historical events (e.g. the settlement of the state

[1] See on this also the discussion about the so-called "new spaces" in the USA, which emphasize the advantages of firm foundations, start-ups and production structures as a whole in those areas and regions which do not have an industrial and institutional "heritage" or which are socially separated from the established industries and thus offer fundamentally new opportunities to build new industries with own behavioral patterns, independent of existing development paths (Scott 1988).

or state-funded aerospace and defence industry in the arid areas of the south-west in the USA) that will determine which regions become the pioneering locations in which concentrations of a new industry first emerge.

Not all regions in which firms have settled during the localization phase, however, will develop the same dynamic or develop along the same development paths. In the end, very few regions will retain significant industry concentrations. Again, this emergence of different development paths is due to regional contexts which include, for instance, individual decisions of single entrepreneurs as well as the strategic direction of single companies. Thus, the emergence of each new industry results in the creation of a limited number of new, dynamic clusters the firms of which achieve supra-regional and possibly even international competitiveness. This process of *selective clustering* includes the formation of permanent agglomeration advantages, which attract qualified employees, additional firms, as well as investments from outside the region. In general, this phase of cluster development takes place in parallel with the new industry reaching its growth and maturity phase (cf. Menzel/Fornahl 2005), so that vertical linkages and internal differentiation come to play a more dominant role. A strong selection process in the cluster leads to the retention of the most appropriate competences and strategies via imitation and to the departure of competitors with less suitable skills (Kiese 2008b).

Taking already established clusters as the starting point, growth peripheries can be tapped in the dispersion and relocation phase (Mossig 2008; Sautter 2005) that follows the stage of selective clustering. This, however, does not necessarily lead to a weakening or even shrinking of the existing lead clusters. Rather, depending on the cluster type in question (e.g. research-driven clusters, production clusters) and/or the phase in the cluster life cycle, it can result in an outsourcing of certain (e.g. labour-cost-intensive) production steps, whereas other corporate or research-side functions remain in the main cluster (central R&D, further HQ functions). In the case of a radical reorientation in an industry, for example in the case of technological breakthroughs with completely new standard requirements, one may also see a complete change of cluster location – often accompanied by a shift of the growth focus. Once again, 'windows of locational opportunity' can open up for new or renewing industries in different locations (Sautter 2005), in turn setting off a clustering process with its own dynamic.

2.2 Approaches to typologizing clusters

Acknowledging the conceptual blurring of the cluster concept in the course of its translation into promotional policy, as well as the somewhat inflationary use of the term, many academic circles have recognized the necessity to specify the term cluster in more detail or to at least differentiate its use. With a view to the cluster potentials in

Germany which will be detailed below and the systematization of cluster policies that will constitute the main focus of the paper, we will at this point reflect on existing cluster classifications and their potential use for our specific intentions.

One essential criterion when creating a differentiated terminology is the question of the form of the relationship between the actors who are organized in a cluster, or whether relationships exist at all. A central reference in this matter is for example the work of Gordon and McCann (2000), who differentiate between pure agglomerations, industrial complexes and social networks, as well as various publications by Tichy (1997; 2001), in which he discusses the dominant orientation of relationships of actors in a cluster and, on this basis, differentiates between network clusters, star clusters and pseudo-clusters. A similar typology was also developed by Markusen (1996), who categorised clusters according to the different functions of cluster companies and the interaction between them. In brief, the author differentiates between 'hub-and-spoke districts', spatial concentrations in which small firms group around several large enterprises, 'satellite industrial platforms', characterized by the external control of many cluster firms by headquarters outside the region, and 'state centred district', where companies are grouped around a public institution which as a rule exercises a corporate or research-related function (e.g. university, research institution). The arguably most striking in these common classifications of cluster types developed prior to the general diffusion of cluster-policy approaches, however, is that none of them takes into consideration any aspects of policy design directly.

Recognising this gap, Enright (2000; 2003) adopted an additional perspective which differentiates between working, latent, potential and policy-driven ('wishful thinking') clusters, thus indicating that the entities referred to as clusters by policy makers cannot necessarily to be regarded as such in an empirical sense. While he concedes that addressing latent potentials by targeted policies is eminently practical, he points out that the specific character of every cluster policy measure must be strongly oriented to the actual requirement of a specific location. In a first, basic step, it thus has to acknowledge whether the reference cluster concerned is already well-developed, whether it is in the initial stages or whether, in the extreme case, it does not yet exist and remains a case of 'wishful thinking'.

In the following years, Menzel and Fornahl (2007; 2009) extended this perspective by a life-cycle-oriented perspective into *emerging, growing, sustaining, declining clusters*, i.e. by the question which development stage a cluster is in (cf. also Feldman/Francis 2006: 117ff.). Beyond Enright's question whether a cluster exists or not, they highlight that its position in the life cycle is of crucial importance for the understanding and the design of cluster policies and the implementation of related support measures. As can

be easily understood with a view to section 2.3, at first sight similar potentials will have to be evaluated and supported differently depending on whether a concentration of firms is present in an industry in the localisation, the selective clustering or the dispersion and relocation phase.

With these basic considerations in mind, Stahlecker et al. (2010) have attempted to classify and differentiate the diverse types of development potentials empirically, by establishing a distinction between 'technology clusters' and 'employment clusters'. Among other things, this classification should make it simpler, to identify the potential of young clusters in technology industries, despite their still low number of employees.

In a distinctly policy-oriented approach, finally, Meier zu Köcker (2009) focuses directly on the political aspects of the cluster concept, by focusing on the structure and development of the support network. From that perspective he distinguishes between 'bottom-up' and 'top-down' clusters, or 'externally initiated networks' and 'internally initiated networks'. As 'bottom-up networks', he classifies those cluster support networks characterized by decentralized governance and only indirectly subject to political influence as 'top-down networks' he classifies those which are organised in a centralized manner and built on public funding initiatives.

2.3 Cluster potentials in Germany

Against the background of the theoretical-conceptual approaches sketched above as well as the existing categorizations of clusters, the next section will aim to empirically establish which cluster potentials can be identified for Germany. In further sections of this paper, this empirical basis will then be used to structure our understanding of the political approaches to promote clusters that can factually be observed.

In general, the key challenge with a view to the empirical analysis of clusters is the fact that it aims at analysing a multi-layered and complex phenomenon (Jappe-Heinze et al. 2008; Koschatzky/Lo 2007) on the basis of scarce and to a limited extent publicly accessible data. For this reason, most empirical studies on clusters draw on a number of auxiliary variables to determine the concentration and the specialisation of economic and technological activities at the level of political-administrative spatial units – which are considered a necessary condition for a cluster to emerge.

In this context, employment statistics at the level of differentiated by administrative districts and industrial fields constitute a significant and reliable source (cf. Sölvell et al. 2008). Additionally, it is possible to develop an analysis based on the extent of patent activities in selected regions broken down by technology fields. By analysing the concentration of regional patent applications in certain regions, statements can be made

about their technological, rather than their mere economic specialization (Stahlecker et al. 2010). Although both indicators say nothing about the a number of characteristics assumed in clusters, such as the networking of actors or the division of labour in innovation and production, the combination of employment and patent statistics can sketch a rough picture of the cluster landscape of regions or nations.

It is crucial to the understanding of this type of analysis, however, to take into account that a potential cluster can only be identified based on concentration and specialisation if two preconditions are fulfilled.

1. Firstly, the cluster industries and/or technologies play an above-average role for the region, i.e. an above-average specialization exists.
2. Secondly, an absolute minimum size of activities in the cluster industries and/or technologies must be attained, defined with a view to the average total.

Under certain circumstances, known focal areas of competence will not be identified as clusters in generally strong regions, since a broad basis of dynamic activities in all, or at least many, fields precludes that outstanding activities take up an above average share in total activities. Without a distinct specialisation, however, the methodology will not identify a cluster.

Based on a combined specialisation and concentration-based approach, Figure 1 identifies the most important industry/technology clusters for all German NUTS2 regions (mostly administrative districts) – measured on the basis of employment statistics – according to number and size (so-called "employment cluster"). For better legibility, the industries and technology fields considered are grouped as sectors and marked with similar colours. In general terms, the figure clearly illustrates that large medium- and high-tech clusters (shades of blue) are primarily located in Baden-Württemberg, Upper Bavaria and North Rhine-Westphalia, while a concentration of service clusters (shades of green) can be identified in Hessen (Darmstadt: administration, Frankfurt: banking and finance), Hamburg, Mecklenburg-West Pommerania, and Berlin. Additionally, there are recognizable size differences between East and West Germany – in line with the distribution of the total work force.

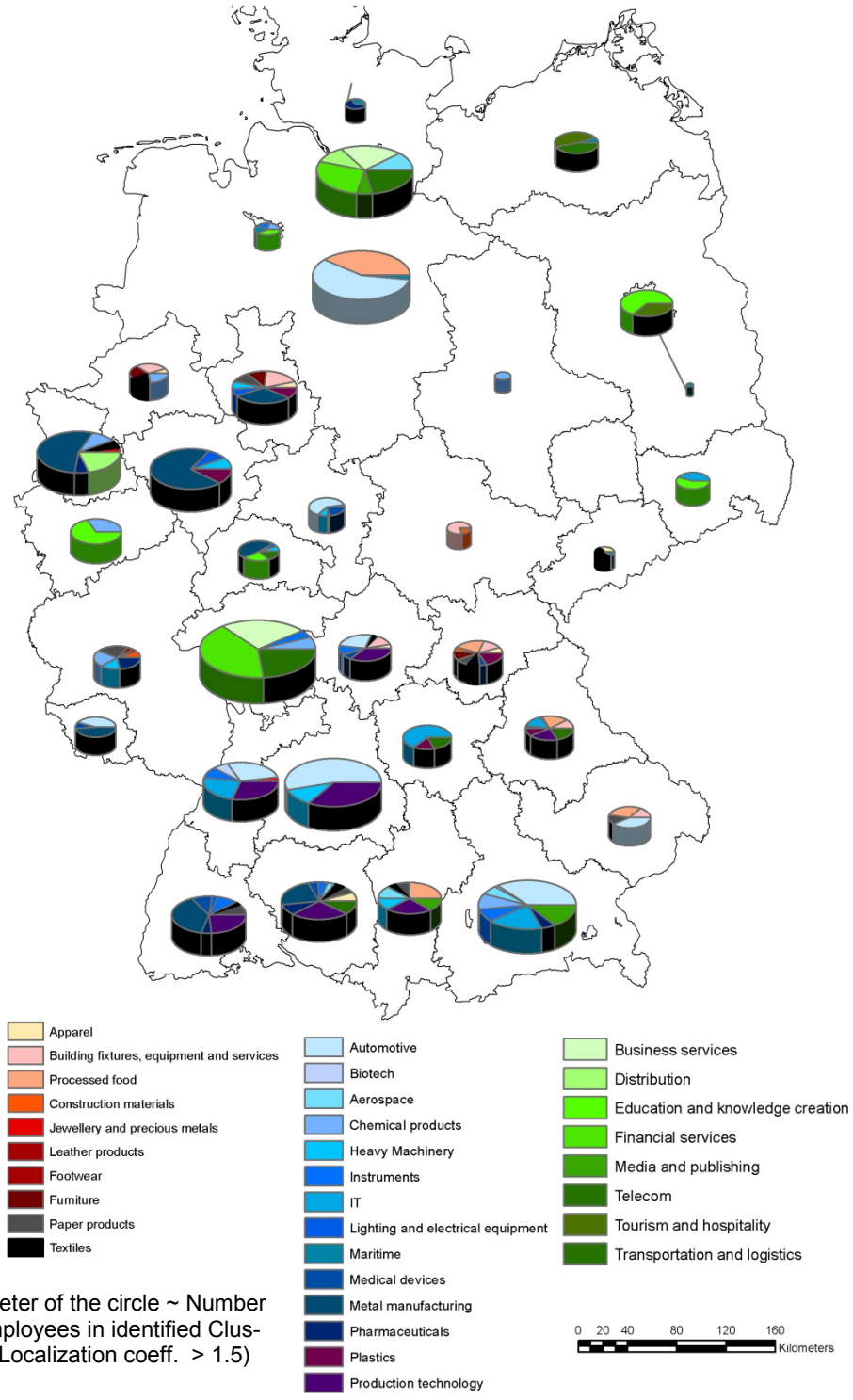
Differentiated by industrial or technology fields, the first and most clearly recognizable employment clusters in the medium- and high-tech industries are those in the leading automotive districts of Upper Bavaria, Stuttgart, Karlsruhe and Eastern Lower Saxony. In the south-west of Germany there are recognizable clusters in the area of production technologies (across Baden-Württemberg and in Schwaben/Bavaria) and important clusters in the field of metal-working (Detmold, Düsseldorf, Arnsberg, Freiburg and Tübingen). With regard to leading-edge technology clusters in the more narrow sense,

specialisations in biotechnology can be identified in Upper Bavaria (i.e. Munich) and the district of Karlsruhe (i.e. Heidelberg). Aerospace clusters can be documented in Upper Bavaria and Hamburg. Moreover, the figure nicely underlines concentrations of the pharmaceutical industry in Rhineland-Palatinate (city of Ludwigshafen), Düsseldorf and once again Upper Bavaria. Finally, important employment clusters in the service sector were identified in the administrative districts of Cologne (media and entertainment), Darmstadt (Frankfurt: business services, financial services), Hamburg (business services, transport and logistics, media and entertainment, financial services) as well as Berlin (entertainment and tourism).

As already mentioned above, the German regions differ clearly with regard to their specific specializations, the number and size of their clusters and the share of employment in the cluster in the respective regional employment total. The largest share in regional employment to which the identified clusters add up is found in Hamburg (eight clusters: 29.6%), Darmstadt (six clusters: 22.3%), Tübingen (ten clusters: 21.5%) and Freiburg (eight clusters: 18.2%). In general, the cumulative share of the region's clusters in total employment tends to be lower in Eastern than in Western German regions: only Mecklenburg-West Pomerania reaches a two-digit result (12.1%) while in all other Eastern German regions cluster employment lies as a rule under 5%, in part due to the often sub-critical total number of employees in them.

With reference to the number of identified clusters (localization coefficient larger than 1.5), the administrative districts Tübingen, Upper Bavaria and Rhineland-Palatinate lead with ten clusters each, followed by Freiburg, Schwaben, Hamburg, Detmold with eight clusters apiece. Finally, Münster, Düsseldorf and Karlsruhe follow with seven clusters each. Typically, these regions tend to be characterized by several dominant competitive clusters, which display a sufficient critical mass of employment, and, in general, tend to be focused on medium- and high-tech industries (with the exception of Rhineland-Palatinate). With a view to the future orientation and sustainability of these "cluster regions", this fact should certainly be regarded as positive, in particular against the background that cluster interfaces are accorded a not inconsiderable significance from an innovation perspective.

Figure 1: Spatial distribution of clusters (employee clusters) according to regions



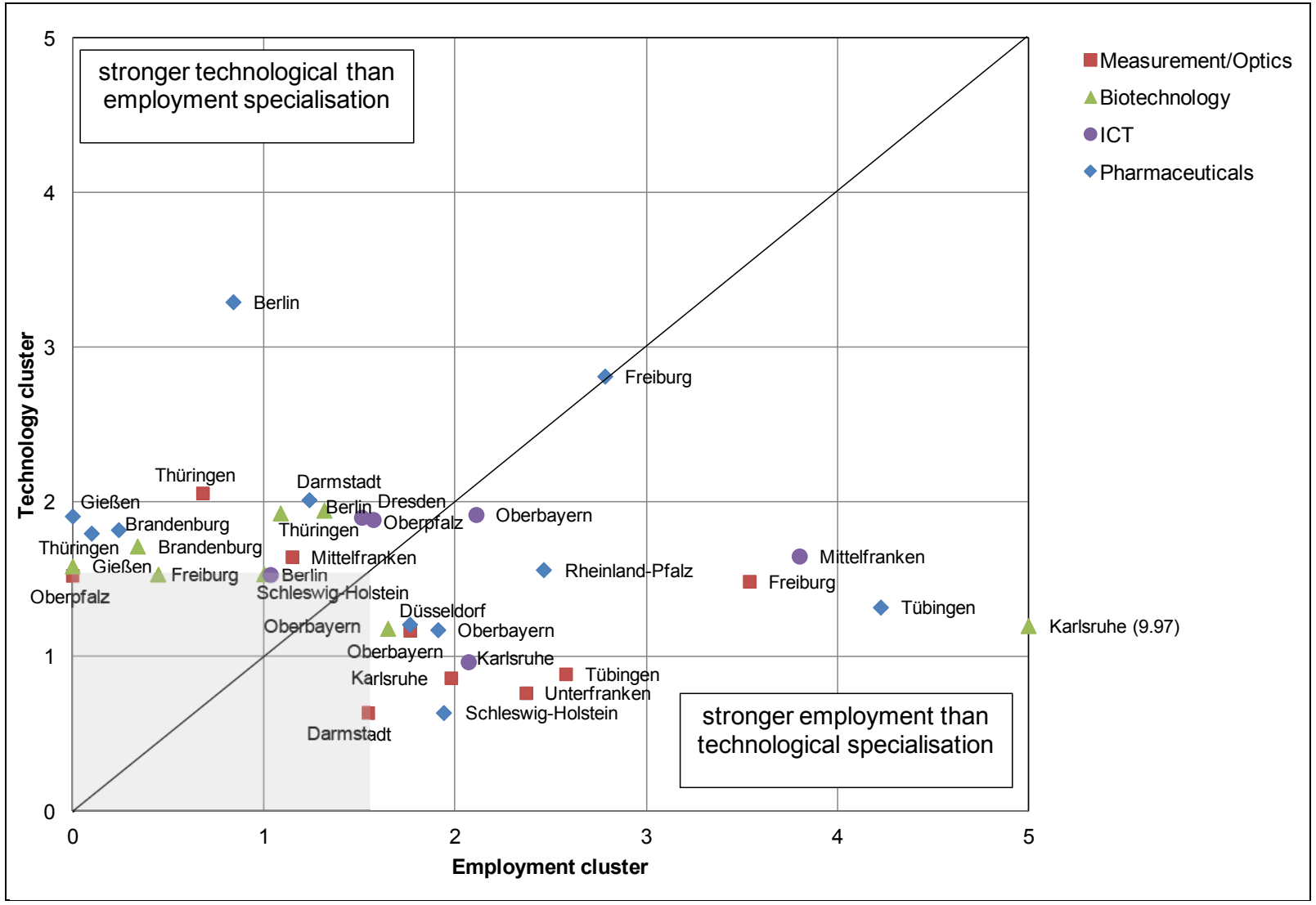
Source: own calculations based on the European Cluster Observatories

Until now, our analysis has identified clusters on the basis of employment in regional industries. Beyond this first step, a comprehensive methodology to identify clusters has to establish whether regional specializations in employment are matched with a similar specialisation in technologies. Based on the aforementioned methodology developed by Stahlecker et al. (2010) the technological specialization of NUTS 2 regions can be calculated analogously to the employee specializations. On this basis, it is possible to distinguish between mainly production-oriented (employment) and mainly innovation-oriented (technology) clusters, as well as those that unite both characteristics.

With a view to the limited space available, however, this paper will not present a full map of technological specialisations comparable to Figure 1. Instead, specializations were calculated for four high-tech fields that are of central importance for Germany: measurement/optics, biotechnology, ICT as well as pharmaceuticals. On that basis, Figure 2 juxtaposes the employment and technological specialisation of individual regions in these four fields, whereby the diagonals separate the more technology-oriented from the more employment-oriented clusters.

A prominent pharmaceutical cluster with a combined employment and technological specialisation in the can be identified in the administrative district of Freiburg while the pharmaceutical agglomeration in Berlin is next to exclusively a technological cluster, whereas that in Tübingen is dominantly an employment cluster. In the field of biotechnology, a similar finding can be observed with distinct employment specialisations (Karlsruhe) more or less balanced situations (Upper Bavaria) as well as some clusters that are mostly identified based on technological specialisation (Freiburg, Berlin). In the field of information and communication technology Upper Bavaria, Upper Palatinate and Dresden unify both employment and technological specialisation whereas other clusters like Central Franconia display a more exclusive specialization on employment. Mere technology clusters, in contrast, are rare in this thematic field. In the field of optics and measurement technologies, finally, the distinction between employment clusters (Lower Franconia, Tübingen, Karlsruhe) and technology clusters (Thüringen, Central Franconia) appears even more clear cut – with few of them uniting both characteristics.

Figure 2: Technological vs. employee specialization for selected high-tech industries



Source: own calculation based on the EPO Worldwide Patent Statistical Database, OECD REGPAT and the European Cluster Observatories

The results of this empirical analysis thus make it clear that the cluster potentials of the individual German regions do not only differ greatly according to extent, intensity and sectoral affiliation (Figure 1), but also with regard to the nature of the potentials which are concentrated on site. As Figure 2 illustrates quite unambiguously, that even high-tech clustering does not necessarily imply technological specialisation. Apparently, the nature of the cluster is to a much higher extent idiosyncratic than dependent on the specific technology field in question.

Consequently, regional policy decision-makers that intend to tap existing potentials by means of cluster-policies can be faced with considerable, yet very different challenges. In a first step, they will have to clarify if there is at all a factual basis for cluster-policy measures in the region. If this is the case, they will not only be challenged to determine the absolute extent of these cluster potentials, but also to establish whether their region is characterised by a "varied cluster landscape" or by one dominant cluster. Secondly, it is important to acknowledge that a cluster identified via the aforementioned methodology does not necessarily already possess the characteristics described by Porter (Porter 1998; 1990). In some cases statistically identified employment concentrations and specialisations can be traced back to single large enterprises which, by themselves, do not yet constitute clusters.

Finally, it is crucial to take into consideration whether the existing cluster potentials are predominantly of a technological or an employment-based nature or if both is the case. As theory suggests, the 'ideal case' of complementary potentials will not always be found, and, depending on the current phase of the cluster development not even be always desirable.

3 Cluster policy in Germany

In Germany as in many other countries, cluster promotion has undoubtedly been established as a common field of policy making since the mid 1990s. Without referring to the term cluster itself, the first dedicated programme with the objectives to create systemic regional competitive advantages was launched with the BioRegio Competition in 1995. Although at this point still exclusively focused on national competitiveness in the field of biotechnology it was the first indication of the growing federal government's intention to help build regional competitiveness. Besides the manifold regional cluster policies which are meanwhile implemented in nearly all federal states, the latest development in German cluster promotion at the federal level is the Leading-Edge Cluster Competition ("*Spitzencluster-Wettbewerb*") launched by the BMBF in 2008 – in financial but also in structural terms.

According to Bruch-Krumbein and Hochmuth (2000), "cluster policies" are primarily designed to strengthen regionally specific areas of specialisation as well as to further develop these "cluster potentials" into actual, well-networked clusters. Just like in other countries, German cluster policy is located at the interface of established policy fields such as industrial policy, technology, research, innovation policy as well as trade policy (MWME 2011; Nauwelaers 2001; StMWIVT 2011). At the regional and the federal state level, cluster policy tends to be additionally deployed to support local business promotion efforts and to pursue objectives in the field of structural policy (StMWIVT 2011; Vieregge/Dammer 2007) – even if this potential and purpose of cluster policies is in many cases initially denied (Rehfeld 2005) or not publicly stated (Kiese 2008a).

In general, the instruments or measures utilized in the framework of cluster policies intend to improve networking, communication and linkages between the various actors 'organized' in the cluster (e.g. workshops and conferences on certain, cluster-relevant issues, on-line platforms, newsletters, regular meetings) (Fromhold-Eisebith/Eisebith 2008). While cluster policy may involve additional incentives, its main objective is to, by means of these "soft measures", moderate processes of networking and to support profile-and image-building (Sternberg et al. 2004). Thus, cluster policies intend to prompt and promote collective learning and co-operative innovation processes.

In addition, it is common to set case-specific additional incentives, for instance in the form of project-related funding and credits, as well as advisory services, public relations campaigns or investment in infrastructure (Fromhold-Eisebith/Eisebith 2008). Typically, German cluster policy is implemented by specific cluster agencies that are responsible both for developing both strategy and individual measures (MWME 2011; StMWIVT 2011). Due to the thematic and organizational complexity of most supported clusters, the professional management of these agencies plays a central role (Kiese 2008b).

With a view to the central objective of this paper, the following sections will present a brief summary of the most important cluster initiatives in Germany – both at the federal government and state level. In doing this, the cluster initiatives are described, in order to systematize them in a synopsis and compare the identified cluster potentials.

3.1 Federal government measures

The currently most important instrument of the federal government to promote clusters is undoubtedly the *"Leading-Edge Cluster Competition"*. The support programme was launched in 2008 by the Federal Ministry for Education and Research and constitutes one of the most central elements of the federal governments High-tech Strategy (BMBF 2011). Based on the insight that innovative capabilities are developed in a complex and

reflexive process between qualification, education, innovation, research and research management, the cluster competition aims to leverage the advantages of strategic partnerships between science and industry that constitute the backbone of high-performance clusters with systemic competitive advantages. In line with this comprehensive approach, the set of objectives pursued by the support programme are complex. In the long term, the cluster competition aims at stimulating innovative activity in the lead markets of the future and to thus contribute to higher growth and additional employment. In the short- to medium-term, it aims at bringing together the special strengths of spatially and thematically close actors, facilitating sustainable value creation, realising regional innovation potentials, and building on existing sectoral or technological specializations.

Characteristic for this promotional instrument is its design as a thematically open competition which is carried out in a total of three rounds with an interval of one to one and a half years in between each. The selection of the up to five clusters is carried out by a high-level independent jury in various steps. In general terms, the jury's decision shall be based on three criteria: the current stage of development and the development potential of the clusters, the quality of the innovation strategy to develop competition-relevant unique selling points, as well as a substantial financial commitment of enterprises and private investors (BMBF 2011).

Funding for leading-edge clusters can be awarded for a maximum of five years and is to be allocated in two funding stages. Both projects and cluster management activities are eligible for funding. After two years, all clusters will be re-evaluated by the high-level jury. Up to Euro 200 m are available for each round of the competition, for the competition as a whole therefore Euro 600 m (BMBF 2011).

Although a final assessment of the regional and national impacts of the instrument is not yet possible only three years after the support programme has been launched, it still has to be stated that sustainable effects should have been achieved simply due to the competitive nature of the application process that has prompted self-organized processes of strategy development among a large number of different actors in the context of completing the entry applications. This does not apply only to the "winner regions" of the different competition rounds, but just as well to those that have eventually not been selected. An evaluation of these clusters that do not receive funding from the BMBF – but are nonetheless active clusters – could thus provide interesting insights into the efficacy and transferability of competitive application procedures.

Another central example for cluster policy in Germany is the *Initiative Competence Networks Germany,* under the roof of which the Federal Ministry of Economics and

Technology (BMWi) bundles outstanding innovation networks which are classified in nine thematic fields and eight regions (BMWi 2011).

In contrast to the Leading Edge Cluster Competition, the Initiative Competence Networks Germany does not aim to promote selected clusters financially to a great extent, but regards itself as the "club of the best innovation networks". Membership is granted on application after an examination by a panel of experts and can thus be understood as a kind of "quality label" for already existing innovation networks. Thus, the initiative aims primarily to support cluster initiatives in their efforts to develop a profile which is visible beyond their immediate regional environment and that can help their member firms to successfully position themselves in international competition. With this initiative launched as early as 1999 the BMWi wants to improve networking between industry and research, support the development of clusters, but above all to contribute towards a better international marketing of Germany as an innovation location. The initiatives target group varies according to the different offers and consists of:

1. regional innovation networks,
2. location-seeking investors and start-up founders,
3. decision-makers from firms, administration and politics,
4. scientists and up-and-coming/ next generation scientists, as well as
5. media and the interested public.

The Initiative Competence Networks Germany acts through an external office which is located in the VDI/VDE Innovation + Technik GmbH. The office is mainly responsible for advising networks interested in becoming members, for quality control as well as for ensuring the representativeness of the members. In order to perform these tasks and to implement the initiative, a commitment authorization amounting to 1.2 to 1.4 m euro was earmarked in the BMWi's budgets for the years 2006-2010.

3.2 Cluster-policy activities of the federal states

A third key example for cluster policy is the various *activities of single federal states*. According to the current Operational Programmes (OP) for the European Regional Development Fund (ERDF) almost all federal states are presently engaged in activities which will be co-financed in the framework of the Priority Axis 2. In detail, such cluster policies are mentioned in the OP ERDF of Baden-Württemberg, Bavaria, Berlin ('clusters and competence fields'), Brandenburg, Bremen ('competence clusters'), Hamburg, Hessen, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saarland,

Saxony-Anhalt, Schleswig-Holstein, and Thüringen. Currently, only Mecklenburg-West Pomerania explicitly renounces cluster promotion in the framework of its OP ERDF[2].

Not all federal states which propose cluster policy measures in the framework of the OP ERDF, however, have actually developed an explicit cluster strategy at federal state level. In some cases, the attempt is made to further promote existing network policy measures, or provide additional support in line with the provisions of the National Strategic Reference Framework. In Saxony, for example, the terms cluster policy and network promotion are explicitly equated (SMWA 2009). Sometimes the promotion of clusters announced in the OP ERDF is not reported in the lists of beneficiaries, so that the previous extent of implementation respectively the existence of a cross-cutting strategy must be called into question (e.g. in Berlin, Brandenburg[3], Hamburg, Saxony-Anhalt, Thüringen). In other federal states, these lists provide evidence of considerable funding for cluster management activities which, however, are more or less performed in isolation and not integrated into an overarching cluster strategy (thus e.g. in Rhineland-Palatinate, Lower Saxony, Saarland, Bremen).

Currently, no dedicated state-policy cluster strategy in this sense exists in the following states: Berlin, Brandenburg, Mecklenburg West-Pomerania, Lower Saxony, Rhineland-Palatinate and Thüringen. In these federal states, the term "cluster" is mostly used in connection with ERDF funding or with reference to selected activities initiated by either the private sector or the communal level. In a study, Saxony-Anhalt has attested to undertaking cluster-policy activities. In fact, however, the study mostly aims at underlining that the relevant clusters in the state are already being appropriately supported through existing support programmes (VDI Technologiezentrum/Technopolis Austria 2008).

A growing number of federal states, on the other hand, have developed dedicated strategies with the aim to comprehensively promote clusters as a means to support the development of the regional economy.

One example of a very explicit cluster strategy developed by regional policy-makers is the *Alliance Bavaria Innovative* (www.cluster-bayern.de), in which from 2006 to 2010

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2 The guideline to promote regional networks mentioned by Wessels (2009) at this point can only to a limited extent be understood as a cluster-policy from the authors' perspective, above all as the OP ERDF (WM MV 2007: 69) explicitly denies the existence of a ERDF co-funded cluster policy.

3 The "cluster orientation of regional policy in Brandenburg" named by Wessels (2009) here is currently no longer documented on-line by the state government and can therefore no (longer) by regarded as the guiding concept.

19 clusters were promoted with on average Euro 2 m. In general, funding allocated through the programme served primarily to cover personnel and material costs required to finance the activities of specifically equipped business offices. Additionally, it can be spent for advertising purposes and for activities related with setting up working groups. In addition, a "cluster project fund" with Euro 50 m from ERDF funds was set up to support projects that were initiated based on activities of the cluster offices or cluster working groups. In principle, the programme aims at an increasing participation of the target group in financing the cluster offices' activities with the ultimate objective that those become financially self-sustaining. This, however, remains far from achievable in practice. Each cluster is headed by a voluntary "cluster spokesperson", a well-known personality whose personal network is sufficiently extensive to convince the regionally relevant actors of the benefits of the new cluster initiative and to motivate them to participate in related activities. The activities themselves are planned and managed by cluster and project managers whose salaries are financed from the support budget. After two evaluations, the promotional program has shortly been extended for a further five years. The large number of 19 clusters was maintained (StMWIVT 2011).

Similarly, the North Rhine-Westphalian state government identified 16 clusters, which are set-up differently (Programm *Exzellenz.NRW*, www.exzellenz.nrw.de). In a similar way as in Bavaria, each office financed by the North Rhine-Westphalian cluster policy received around Euro 2 m of public funding. To a stronger extent than in Bavaria, however, these offices have the task of coordinating existing activities and propose new ones – rather than those with the objective to initiate actual projects. In this context, the legacy of the "competence field promotion" can still be felt. This approach preceded the current cluster strategy and according to Kiese (2008a: 86) stressed "less the empirical phenomenon [of clusters], but rather the political will to promote" certain areas of the economy. The current strong focus on the promotion of management activities can therefore be understood as aimed at counterbalancing the earlier programmes problem that "the majority of the 'competence fields' [lacked] a convincing management, assertive personalities and [...] acceptance in regional industry" (Kiese 2008a: 89). At present the 16 politically selected state clusters can be understood as ERDF financed umbrella organisation each of which is set up to co-ordinate the activities of several existing cluster initiatives (e.g. in the case of Automotive.NRW). In some cluster fields (e.g. in the case of Energieregion.NRW), however, no initiatives have so far been set up and the politically motivated cluster is managed by the responsible ministry. In this case, no specific ERDF funding is awarded. Besides the cluster management activities, the core of the NRW cluster policy is to coordinate the calls for proposals in different thematic areas and with different objectives. In these competitions, enterprises from the different clusters can apply for additional project funding. For these activities ERDF funds of up

to Euro 635 m have been set aside under the Priority Axis 2 "Innovation and knowledge-based economy", and will to an equal share be co-financed by wither the federal state, the municipalities or the private sector (MWME 2009). With a view to those calls for proposal, the NRW cluster policy has considerably more money at its disposal than the Alliance Bavaria Innovative. Recently, one specific focus of these additional calls for proposals was placed on the energy sector. Basically, differences are made between 16 cluster-specific, industry- and technology-oriented competitions, thematically open bottom-up competitions to promote other regional clusters (Regio-Cluster) as well as competitions to address selected cross-cutting topics identified by the state government such as tourism, start-ups or technology transfer (MWME 2011).

In *Schleswig-Holstein* the regional cluster strategy was developed by the partly state-owned Wissens- und Technologietransfer Schleswig-Holstein company (WTSH) and is on the political front accompanied by events and targeted adaptations of the existing system of support measures. Like in Bavaria and Northrhine-Westphalia the selection of the cluster fields to be supported was more or less the result of a top-down political decision – without however resulting in an overarching implementation of dedicated structures, as was the case in these states. Furthermore, the cluster management structures in Schleswig-Holstein are not set up separately based on ERDF funding, but located directly at the state government's project managing agency WTSH. As a result even the actual process of cluster support is more directly part of to the political arena than in Bavaria or Baden-Württemberg. In Schleswig-Holstein, the term "cluster" thus describes a field of political priority-setting rather than a particular agency or network. In different words, it can be seen as a publicly acknowledged agreement between independent stakeholders, who want to coordinate their activities in view of their joint interests, involving the WTSH is the main contact point. In general, there are therefore no dedicated agencies to conduct cluster activities in any of the clusters defined by the state government (exceptions are: Norgenta Life Science Agentur, Logistikinitiative Schleswig-Holstein). Instead, all related activities are organised by industrial stakeholders directly, by associations or by chambers of trade and industry (WTSH 2011).

A further opportunity to actively encourage clusters via policy measures is to conduct "cluster competitions", as for instance in *Baden-Württemberg* and *Hessen*. In various calls for proposal, existing network initiatives can apply to be recognized as a "cluster", which enables them to access specific national and European funds. In this framework, cluster management activities are typically not generously supported (with about Euro 350,000-450,000), although some exceptions do exist (up to Euro 600,000). In Hessen drawing up a plan for cluster management can be additionally funded with Euro 25,000. In both federal states, the degree of institutionalization of the selected initiatives differs broadly, depending on the prior structures. In part, there are dedicated organizations

that are structurally not dissimilar to a Bavarian cluster office. Some other initiatives are organisationally attached to chambers of trade and commerce or regional economic development agencies whereas in yet other clusters the management tasks remain distributed among many persons, despite a central contact address. Different from the approaches of Bavaria and Northrhine-Westphalia, competition-based approaches do not as such aim at the creation of new cluster management agencies, but rather at enabling existing cluster initiatives to expand their activities and at strengthening the 'cluster orientation' of existing activities at chambers and associations. As a result, the significance of private sector initiatives and co-financing tends to be a priori higher than in cluster strategies developed in a top-down process. This pronounced focus on a bottom-up orientation of both the development of the network and the financing model is a crucial characteristic of competitive approaches. In this context, regional business promotion agencies may play a central, supporting role (MFW 2011; MLR 2011; MWVL 2011a; MWVL 2011b).

A further model is the *Saxon cluster policy* (SMWA 2009) which is to a similar extent based on a "bottom-up" strategy. The Saxon 'Joint Initiatives of Industry', however, were jointly launched by the Free State and industry without any competitive procedures. In contrast to e.g. cluster members in Baden-Württemberg and Hessen, their members do not become eligible for specific additional funding by the mere fact of engaging in a "cluster". They do, however, receive some preferential consideration in the allocation of co-operative support funding, even though the nature and extent of this preferential consideration are defined comparatively openly.[4]

Finally, the cluster processes in *Hamburg* appears worthy of mentioning, as they are almost completely funded by industry (the Chamber of Trade and Commerce) as does the *Initiative Mitteldeutschland* (part of the 'Economic Initiative for Central Germany') which acts almost without state support and independent of government guidelines. In the case of *Mitteldeutschland* this is to a great extent due to the initiatives cross-border approach and ambitions. In Hamburg it is mostly due to the fact that in the face of the overall quite limited amount of ERDF funding available, local policy makers decided to waive their right to use it for the co-financing of cluster policy (Handelskammer Hamburg 2006; Handelskammer Hamburg/IHK Schleswig-Holstein 2009; Wirtschaftsinitiative für Mitteldeutschland 2011). Nonetheless, both approaches seem to develop fairly successfully.

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4 The "State excellence initiative for Saxony" quoted here by Wessels (2009) does not, in the authors' understanding, represent cluster-policy measures, but corresponds to one of the research-promoting measures in the Excellence Initiative of the federal government.

Finally, there are a number of policy approaches in several federal states which are by nature very similar to cluster policies, although they are not officially called such. Among these are the "Coherent Innovation Strategy of the State of Berlin", recently succeeded by the "Joint Innovation Strategy – innoBB" (SVWTF 2011), the "Innovation Strategy of the Saarland" (StK Saarland 2011) as well as the long term promotion of Lower Saxony's "Technological Initiatives" (MWAV 2011). In many of the conceptual descriptions of these policy guidelines and programmes the term "cluster" has been used explicitly and regularly, especially in the first two cases. One main difference, however, is that most of these 'cluster-like' activities were designed independently at the federal state level without having been to the same extent co-ordinated with the regional OP ERDF as elsewhere.

3.3 Interim conclusions

The previous sections demonstrate quite unambiguously that the cluster policies that are pursued on different political levels in Germany differ in multiple ways despite their sharing a common objective. As a result of administrative framework conditions and political target systems that differ broadly between the different federal states and the federal level, a simple and exhaustive categorization of cluster policies appears neither feasible nor desirable. That notwithstanding, two core dimensions can be identified, which can help to structure our understanding of the diversity found among the different approaches to cluster policy in Germany.

Firstly, cluster policies differ with regard to the **central objective** that policy makers aim to pursue by them. Even if all cluster policies are to a certain extent based on the idea of "strengthening strengths", this applies to the leading-edge cluster competition of the federal government in an entirely different way than to many of the ERDF-promoted measures implemented in individual federal states. Even if all types of cluster policies are in the ERDF terminology recognised as 'means of promoting innovation' it is fairly obvious that in practice some of them have a rather balancing dimension to them. Where cluster strategies are in part aimed at more than 20 clusters, it appears logical to conclude that their actual objective is in fact much closer to 'leveraging all available potentials' that to 'promoting selected fields of strength'. In other words, some cluster strategies aim to stimulate innovation and in selected areas of strength or excellence whereas others aim to balance growth across industries and to safeguard employment.

Secondly, cluster policy measures differ with regard to the **way in which the focal areas of promotion are selected**. Whereas some initiatives are soundly embedded in a comprehensive political strategy aimed at a top-down promotion of politically selected fields of strength, others are decentrally established and developed in a bottom-up

process by industrial stakeholders and only later subsidized by the state (Fromhold-Eisebith/Eisebith 2005). A middle way in this regard is pursued by those approaches in the context of which cluster offices are publicly funded, but must qualify for this funding via participation in open topic competitions. In practice, most of the concepts submitted as a response to the public call for proposals have been developed by industrial actors. While funding is thus allocated in a top-down process, the decisions on the fields of strength considered worthy of promotion is at least guided by the (bottom-up) proposals for initiatives that are submitted by industrial stakeholders themselves.

Furthermore, most decisions on the exact approach to be pursued have to take into consideration questions of the administrative feasibility and the 'policy trend' dominating at the time the measure was introduced (Kiese 2008b). Whereas the introduction of 'cluster policy' as a field of action in European Cohesion Policy has in some respects led to a certain standardization of cluster policies ('monitor-style cluster policies', see Asheim et al. 2006: 21), it is clear that idiosyncratic political-administrative decisions taken by the individual policy makers in charge continue to dominate.

4 Summary and conclusions

The empirical sub-sections of this article have shown that the both production and technology oriented clusters are a very diverse and regionally embedded phenomenon. Within this context, the observed diversity of political strategies and support measures whose ultimate goal is to 'generate cluster advantages' cannot genuinely surprise, even if its remains criticized by academics (Kiese 2007; Martin/Sunley 2003).

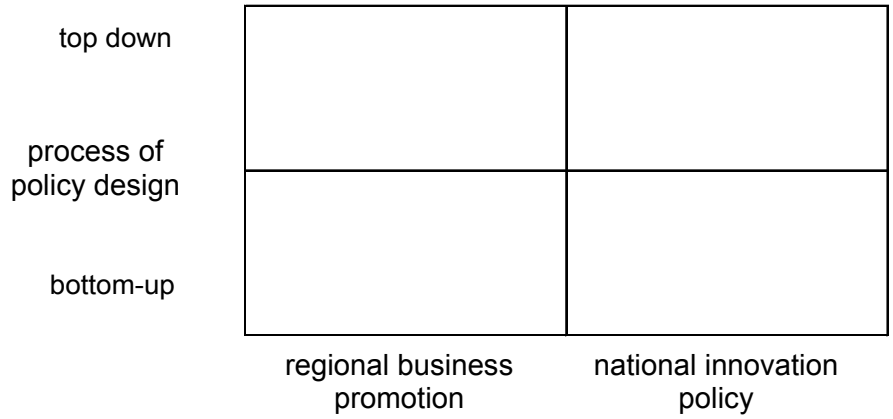
In a first step, the empirical section of this paper has demonstrated why a standardized policy approach to support clusters can hardly appear appropriate from a practical perspective. Too different are the framework conditions with which policy makers are confronted in their different constituencies, not only with regard to the absolute extent of cluster potentials in the respective region, but also with a view to the question if those are integrated in a diversified or in a overly specialised economic environment. Even in the same technological field, considerable differences exist with regard to the nature of different cluster potentials in that some are more strongly based on innovative capacities with others are mostly based on employment and production. Moreover, the complementary agglomerations of innovative potential and productive capacity, which are explicitly and implicitly taken for granted in large parts of the theoretical literature, can in practice only be found in a limited number of the empirically identified clusters, even in 'high-technology industries'. It is this spatial division of labour between research and development, on the one hand, and production, on the other hand, to which cluster policy players have to necessarily react by deviating from the assumptions taken in the

conceptual literature and, consequently, some the central policy conclusion derived based on them.

In a second step, it could be demonstrated that cluster policies differ substantially not only with a view to their integration in political strategies and their specific administrative implementation. Additionally, it was possible to illustrate that the implicit political objectives of many of them were not alike. While the justification for almost all of them refers in some way to the common objectives of employment, growth, competitiveness and innovation, we could point out that the respective prioritizations differ quite strongly between some excellence-oriented federal and some regional programmes with a more balancing objective. Depending on the respectively current political trends, different political goals can be focused on. On the one hand, some federal measures aim to increase the international competitiveness and internationalisation of firms in selected industries by targeted investment in large-scale R&D projects. On the other hand, many regional measures put a main focus on topics like the intensification of regional networking, support for start-ups as well as the general qualification of the regional work force. In some case, even the alleviation of regional disparities may play a role.

Against this background, it becomes clear that, in the logic of most of the promotional programs covered in this paper, the effects described by Porter (Porter 1998; 1990) are seen as an appropriate means to quite different ends. In some cases, they are aimed at increasing the competitiveness of high-tech industries, while in other contexts they are initially an end in themselves, from which one hopes for positive effects in the sense of economic development even in less productive industries and regions.

Figure 3: A two dimensional sphere of action for cluster policy makers



Source: own figure

In summary, it becomes clear that an adaptive utilization of the conceptually rather open cluster concept, appears both logical and politically expedient. As a result of this flexible conceptual basis, a broad sphere of action opens to policy players who intend to pursue certain objectives by means of cluster policy (Figure 3). Inevitably, different policy makers can (and should) take different approaches to cluster policy, according to their main political competences and areas of responsibility. Hence, the highly diverse development of cluster policy that could be observed in the course of the last decade can be considered as justified in principle. Nonetheless, this general assessment should not prevent responsible policy-makers from critically evaluating their specific decision. Precisely in a political field of action that requires a degree of situative adaption as great as cluster policy, intensive and regular evaluations appear necessary in order to prevent haphazard and ill-informed developments.

Along with the diversity of the goals pursued by means of *cluster-policy measures* and the complexity of the actually implemented programs (multi-actor measures), the fundamental necessity to conduct evaluations increases in line with the requirements placed on the strategic monitoring of the respective programs and measures.

Where a fundamental decision about the appropriateness of certain measures cannot be taken, it must be checked in detail whether the implemented measures are actually in the interest of the intended target group and if the current and potential beneficiaries of the additional promotional offers will in technical terms by able to profit from them. Consequently, efficacy analyses, strategy consulting as well as the initiation of and support for learning processes should play a central role in the future development of cluster policies adapted to specific national and regional challenges. Fortunately, many cluster agencies are confronted by similar challenges and fulfil similar tasks despite their different individual objectives – so that a certain degree of standardisation in at least the techniques used for evaluations appears possible.

In general, however, considerable methodological challenges are bound to arise in the area of policy benchmarking, primarily with regard to the development of quantitative performance and evaluation criteria. Due to the differences in the intended as well as the objectively targeted goals of cluster policy measures, a comparability of cases and programs can rarely be assumed so that direct, uncritical comparisons and 'cluster benchmarks' are bound to be much less fruitful and robust than sometimes suggested. Precisely for this reason, future evaluations and accompanying research should pay particular attention to the issue of quantitative indicators. In this field, however, the main objective should not be to draft a 'general methodology to evaluate clusters' but rather to design programme-specific sets of indicators, which can serve appropriately and concisely address the objectives pursued by concrete cluster support programmes.

Due to the limited availability of suitable secondary data, it will in many cases become necessary to develop a specific monitoring concept.

At the end of this paper we thus come to the conclusion that a 'convergence' of cluster policy measures is neither to be expected nor to be hoped for in the foreseeable future. This gives rise to two crucial challenges for policy consulting. On the one hand, the development of standardized methods to identify cluster potentials will play a central role because many political makers have a legitimate interest to better understand their initial position based on which they have to develop adaptive policy approaches. In the area of evaluation and monitoring, on the other hand, it remains indispensable to adapt the selection of indicators to their respective reference framework, i.e. to derive them from the specific targets defined by the concrete policy makers in charge.

5 Literature

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