

Cluster Policies, Organising Capacity and Regional Resilience: Evidence from German Case Studies

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Abstract Resilience refers to the ability of a regional economy to recover from external shocks and to return to a sustainable growth path afterwards. This paper departs from the assumption that by improving a region's organising capacity, cluster policies can strengthen regional resilience. We argue that the impact of cluster policies on regional resilience depends on the portfolio of clusters targeted for promotion, which may increase specialisation, unrelated or related variety in a region's economic fabric. Based on a multidimensional model of cluster policies, case study evidence from seven German regions is drawn from an interview survey of 145 practitioners, policy advisors and independent observers. By illustrating the connections between cluster policy, organising capacity, and specialisation versus variety, these findings can be linked conceptually to regional economic resilience. This argument allows for some policy recommendations and the formulation of issues for further research.

Keywords Cluster policy · Organising capacity of regions · Specialisation · Related variety · Regional resilience · Germany

Clusterpolitik, Organisationskapazität und regionale Resilienz: Ergebnisse deutscher Fallstudien

Zusammenfassung Resilienz beschreibt die Fähigkeit einer Regionalwirtschaft, sich von Schocks zu erholen und danach zu einem nachhaltigen Wachstumspfad zurückzukehren. Dieser Beitrag geht von der Annahme aus, dass Clusterpolitik durch ihren Beitrag zur Verbesserung der regionalen Organisationskapazität die regionale Resilienz stärken kann. Dieser Zusammenhang wird durch das Portfolio geförderter Cluster gesteuert, der entweder die Spezialisierung oder die unverbundene oder verbundene Vielfalt (*related variety*) der regionalen Wirtschaftsstruktur erhöht. Ausgehend von einem mehrdimensionalen Verständnis von Clusterpolitik werden die Ergebnisse aus sieben regionalen Fallstudien vorgestellt, für die 145 Interviews mit Praktikern, Politikberatern und unabhängigen Experten durchgeführt wurden. Die Ergebnisse illustrieren den Zusammenhang zwischen Clusterpolitik, regionaler Organisationskapazität und Wirtschaftsstruktur zwischen Spezialisierung und Vielfalt, woraus sich auf theoretischer Basis Rückschlüsse auf die Resilienz der Regionen ziehen lassen. Die Argumentation ermöglicht die Ableitung einiger Handlungsempfehlungen und verweist auf zukünftigen Forschungsbedarf.

Schlüsselwörter Clusterpolitik · Regionale Organisationskapazität · Spezialisierung · Vielfalt · Regionale Resilienz · Deutschland

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1 Introduction

Differences in economic performance across space and the quest for their determinants have always been at the core

of economic geography and regional economics. When Lehman Brothers collapsed in 2008 and triggered a financial crisis that led to the worst global recession in many decades, it soon became clear that national and regional economies were affected to strikingly different degrees by this external shock, and also displayed marked differences in the way they recovered from the crisis. Against this backdrop, the concept of regional resilience rapidly gained popularity in academic and, to a lesser extent, in policy circles as well. Originating in environmental studies where it denotes the “biological capacity to adapt and thrive under adverse environmental conditions” (Christopherson/Michie/Tyler 2010: 3), it was swiftly adopted by economics and the social sciences at large. In the comparative-static world of mainstream economic modelling, resilience came to be understood as a region’s capacity to restore the previous equilibrium after a temporary disruption. More recent models also allow for multiple equilibria, meaning that a region may settle for a new equilibrium once it has recovered from the shock (Wink 2011: 113). Evolutionary economics and evolutionary economic geography offer a different perspective, focussing on political and economic processes at the heart of regional resilience (cf. Simmie/Martin 2010; Martin 2012). According to Christopherson/Michie/Tyler (2010: 4), these processes create “capacity, including governance capacity”, and determine a region’s vulnerability to external shocks.

Compared to regional resilience, the cluster concept may look old-fashioned, but is still around after two decades, proving resilient in its own right despite the occasional fatigue. Fromhold-Eisebith (2012: 43 ff.) compares and contrasts the concepts of clusters and resilience, but goes on to show the potential for conceptual linkages. This paper takes up the latter thread. By reviewing regional cluster policies in Germany on a case-study basis, we aim to assess how and under what conditions these policies can strengthen a region’s governance or organising capacity to ultimately improve its resilience. We start by conceptualising cluster policies in seven analytical dimensions, and linking to organising capacity as a concept of regional governance stressing vision and leadership as a precondition of regional resilience. We explore the relationship between cluster policy and resilience based on a classification of cluster policies from specialisation to variety. Following an introduction to our research methodology and case studies in Sect. 3, we present our empirical findings and their implications for regional resilience in Sect. 4. Reflecting on the conditions necessary for cluster policies to have such an impact, we finally draw policy conclusions and highlight needs for further research.

2 Cluster Policies, Organising Capacity and Resilience: A Conceptual Framework

2.1 Clusters and Cluster Policies

Over the past two decades, the cluster concept has become firmly established in regional and innovation policy, as well as in regional and local economic development at all spatial levels across Germany. Policy documents most commonly refer to Porter’s definition of clusters as “geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate” (Porter 1998: 197 f.). Despite—or due to—its rather broad character, this definition is most widely used and may well serve as a common denominator of most alternatives. Its fuzziness has triggered a fair share of scholarly criticism, of which Martin/Sunley (2003) is still the sharpest, whilst echoing a more general critique of conceptual fuzziness and lack of empirical rigour by Markusen (1999). Furthermore, clusters which overwhelmingly emerge and evolve organically over matters of decades or even centuries are frequently confused with organised efforts to stimulate and manage clusters in policy and practice. The technocratic perspective is that clusters are made rather than occurring spontaneously, which strikingly contrasts with all established wisdom on cluster genesis and evolution (cf. Braunerhjelm/Feldman 2006). There is thus a need to restore the balance between evolutionary and constructive forces in cluster development (cf. Sölvell 2009).

Leaving the conceptual fuzziness of clusters aside, (regional) cluster policies comprise all “efforts of government to develop and support clusters (in a particular region)” (Hospers/Beugelsdijk 2002: 382; parentheses added). Cluster policy may hence be seen as a particular form of industrial policy targeting specific regional features and aiming at the development of certain building blocks already in place (for example specialised agglomerations, networks) into clusters, or at growing potential and latent clusters into working ones (cf. Enright 2003: 104). From an evolutionary perspective, cluster policies emerge at the interface of hitherto largely unconnected established fields, such as industrial policy, science, technology and innovation policy, as well as regional and local economic development policy (cf. Boekholt/Thuriaux 1999, Nauwelaers 2001). It may thus be expected that the interpretation of the cluster approach is critically shaped by past experiences in the respective field. For instance, applying the cluster concept in science policy will likely differ noticeably from an application to local economic development.

Focusing on public agency, this concept of cluster policy differs from the wider term cluster initiative, in which clus-

ter firms assume centre stage, supported by government and/or research institutes (cf. Sölvell/Lindqvist/Ketels 2003). Within this broader concept, cluster policy may therefore be seen as a subset characterised by substantial state involvement through initiation, funding and/or governance. Somewhere along the spectrum of public-private partnerships, an imaginary line may be drawn to set cluster policies apart from private-led initiatives. In addition to this *governance dimension* that has already been highlighted by Fromhold-Eisebith/Eisebith (2005), Kiese (2008a: 131 f.) develops six further dimensions to characterise and delineate cluster policies in empirical research:

- Cluster reference: Policy may explicitly refer to the term ‘cluster’ e.g. for marketing purposes without any deeper conceptual meaning. On the other hand, cluster policy might remain implicit, avoiding the catchword while still promoting spatial concentrations of industries and technologies and the externalities generated therein. Explicit cluster reference is thus unsuitable as a strict definitional criterion, especially since many countries outside the English-speaking realm tend to prefer other terms which better reflect their particular policy traditions, such as *pôles de compétitivité* in France, or *Kompetenzfelder* or *Kompetenznetze* in Germany. Despite subtle variations in meaning, their common reference to the cluster concept is obvious.
- Coherence: Cluster policy should ideally be led by a shared vision and common strategy agreed upon by all stakeholders and levels of governance, requiring substantial horizontal and vertical co-ordination. If this co-ordination cannot be achieved, a region might end up with an incoherent cluster policy in which isolated actors compete in applying isolated measures promoting different parts of a given cluster, or even pursuing conflicting aims.
- Complexity: Clusters may be promoted with single instruments like targeted incubators, industry networks or business plan competitions. However, the complex character of clusters demands the use of multiple instruments to pursue a more holistic approach towards cluster promotion. Complexity may also denote the targeting of more than one industry or technology to better reflect a region’s industry structure, avoid overspecialisation, and create synergies and opportunities for breakthrough innovation at the interfaces of previously distinct technologies. This line of thinking has led to the recommendation of platforms based on common knowledge bases and related variety for resilient regional development, rather than a too narrow specialisation on individual clusters (cf. Asheim/Boschma/Cooke 2011; Cooke 2011; Wink 2011: 121).
- Institutionalisation: Cluster policy may be weakly institutionalised when objectives and tasks are formulated in non-binding memoranda of understanding between partners with a rather loose commitment. A higher degree of institutionalisation is achieved when individuals or organisations are charged with implementing a cluster strategy. The creation of a dedicated cluster management organisation represents the strongest form of institutionalisation, with the main stakeholders expressing their commitment financially by becoming shareholders.
- Cluster orientation: A policy strategy in support of regional innovation and growth rarely focuses on clusters exclusively. In practice, support of clusters may be mixed with generic economic development measures to address issues like new firm formation or skills development across the board irrespective of cluster membership. After all, instruments like incubators or start-up contests can be generic, i.e. open to all industries and technologies, or focused on specific clusters. Cluster orientation may thus vary and can be approximated by the share of projects exclusively targeting clusters out of a given set of policy measures. As a stylised fact of regional cluster policies in Germany, Kiese (2012: 330 f.) concluded that lacking proper analysis of real cluster potential, the cluster orientation of policy approaches tends to decline over time at the expense of generic policy measures which are usually easier to implement.
- Maturity: Last but not least, the ability to evaluate cluster policies critically depends on their maturity: is a policy still being conceptualised, already being implemented or is it already completed? Highlighting the process character of cluster policy obviously calls for an evolutionary perspective that accounts for path-dependency and cumulative learning (cf. Kiese 2010).

2.2 Cluster Policy, Organising Capacity and Regional Resilience

Regarding the governance dimension of cluster policy, more recent accounts explicitly acknowledge the characteristic interaction between public and private agency by using the term ‘policy’ more broadly to “include those activities designed and carried out by semi-public and/or private actors as well” (Borrás/Tsagdis 2008: 20). This clearly echoes the discourse on governance referring to “the reflexive self-organisation of independent actors involved in complex relations of reciprocal interdependence” (Jessop 2003: 101). These actors may be public or semi-public, private businesses or members of civil society. In a similar fashion, Mayntz (2003: 72) defines governance as all forms of collectively resolving civic tasks that may stretch from the institutionalised self-governance of civil society via different forms of interaction between public and private actors to sovereign actions of public bodies. The governance approach not only corresponds with the complex constellation of actors in clusters, but also reflects a shift

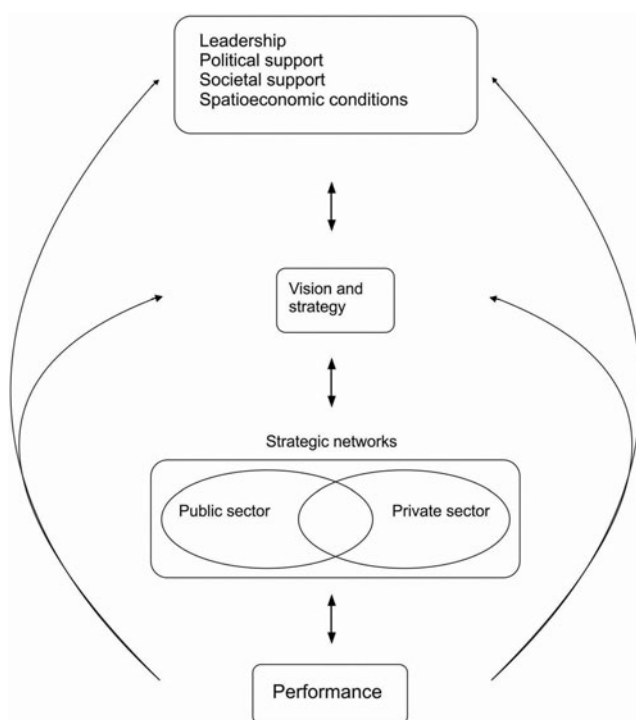


Fig. 1 The organising capacity of regions. (Source: Van den Berg/Braun/van der Meer (1997: 260))

towards a more co-operative and activating role of the state, setting incentives for self-regulation rather than directives to develop the self-governing capacity of economic and societal sub-systems. However, as networks may evolve into a state of excessive embeddedness (cf. Uzzi 1997), a combination of incoherence and over-institutionalisation might lead to institutional congestion that ultimately stifles economic development (cf. Skelcher 2000, Exworthy/Powell 2004, Burfitt/MacNeill 2008).

Cluster policies are embedded in regional governance structures, which shape the interpretation and implementation of the cluster concept in structural policy and economic development initiatives. Due to their strategic orientation, cluster policies can contribute to the *organising capacity of regions*, a variation of the regional governance concept that stresses the importance of strategic vision and leadership in regional development, which is also important for cluster policies. Van den Berg/Braun/van der Meer (1997: 253) define “organising capacity as the ability to enlist all actors involved, and with their help to generate new ideas and develop and implement a policy designed to respond to fundamental developments and create conditions for sustainable development”. As Fig. 1 illustrates, the organising capacity of regions builds upon strategic networks linking the private and public sectors, key individuals and collective processes providing vision, leadership, and political as well as broad societal support. Interestingly, the authors also include opportunities for and threats to the regional economy as an element of the organising capacity, which they capture in

the rather clumsy term “spatioeconomic conditions” (Van den Berg/Braun/van der Meer 1997: 259). They hypothesise that “spatioeconomic problems and obstacles can induce parties in the region to collaborate” (Van den Berg/Braun/van der Meer 1997: 259), i.e. that external shocks or other adverse conditions lower the barrier for otherwise isolated actors to team up for a common cause. The outcome or performance depends on the interaction of all elements in their model.

The conceptual link between cluster policies, the organising capacity of regions and regional resilience is summarised in Fig. 2. From left to right, we start with the conjecture that cluster policies enhance the organising capacity of regions, especially if these policies are sufficiently complex and coherent. Their impact on organising capacity is also supported by suitable kinds of governance (mainly bottom-up¹), as well as stronger forms of institutionalisation which tend to reflect commitment and durability. Since the latter in turn depends on coherence, complexity, governance, and institutionalisation, we consequently assume a positive correlation between the organising capacity and the four aforementioned policy dimensions, as depicted on the left of Fig. 2.

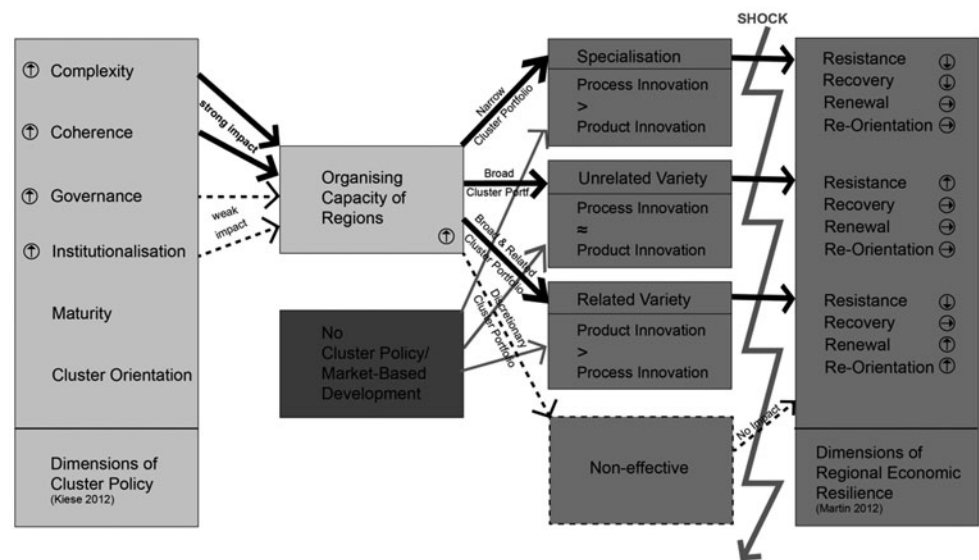
Even with the most careful consideration, we find no theoretical evidence for a *direct* link between regional cluster policies and the economic resilience of regions. For this reason, we add another conceptual element which allows us to specify the hypothetical interrelation between cluster portfolios on the one hand and regional economic variety on the other hand (cf. Frenken/van Oort/Verburg 2007). We accordingly postulate that the variety of a region’s industry structure is influenced by the number and nature of industries addressed by cluster policies—at least partly. More precisely, we assume that a narrow cluster portfolio supports economic specialisation, whilst a broad cluster portfolio promotes unrelated variety. In between, a broad and related cluster portfolio favours the development of related variety.

Moreover, we consider a non-specific and discretionary cluster portfolio to be ineffective in terms of supporting specific industry structures. Also, it must not be forgotten that specialised or diverse regional economic structures usually evolve through market forces and externalities *without* cluster policies, despite our focus on “constructive forces” (Sölvell 2009) in the present paper. The central part of Fig. 2 summarises these hypothesised linkages.

In a final step, we link the concept of regional economic variety to the notion of regional economic resilience (cf. Mar-

¹ Throughout this paper, we use the term bottom-up to denote cluster policies that predominantly emerge from within a region, rather than being induced or even imposed by higher levels within a multilevel governance framework (cf. Kiese 2013). To distinguish public versus private agency, we propose the distinction between publicly-driven cluster policies, which are the focus of the present paper, and business-driven cluster initiatives, whilst acknowledging the broad range of public-private partnerships in between.

Fig. 2 Cluster policies, economic variety, and regional resilience (NB: *Arrows in circles pointing upwards (downwards) indicate increasing (decreasing) values. Arrows pointing horizontally to the right indicate that there is no distinct tendency*). (Source: Authors' conceptualisation illustrated by Dennis Edler)



tin 2012). Given the occurrence of an economic shock, we would expect different degrees of resilience depending on the regions' distinctive industry structures, as illustrated on the right of Fig. 2. While our first proposition, i.e. the linkages between cluster policy, organising capacity, and cluster portfolio, can be inferred from our case study evidence presented in Sect. 4, the second proposition on the link between variety and regional economic resilience will be discussed only from a theoretical perspective in order to provide an informative basis for future research in this field (see Sect. 4.4).

3 Research Methodology and Case Studies

There is as yet no systematic survey of cluster policies in Germany below the level of the 16 federal states. Though direly needed, the comprehensive mapping of all regional and local cluster policies in Germany has not yet been undertaken, not just owing to the high costs involved but most importantly due to the lack of a commonly agreed and operational definition of cluster policy. Based on literature and exploratory interviews, a comprehensive study by Kiese (2012) selected seven case studies of regional (i.e. sub-state) cluster policies. This research focused on the interpretation and application of the cluster idea in different institutional contexts as well as the policy transfer and learning processes involved. Between August 2006 and August 2007, 110 semi-standardised interviews were conducted with 145 cluster policy experts. The sample of interviewees comprised 60 practitioners in ministries and economic development agencies (of which 19 explicitly classified themselves as cluster managers), ten consultants and 75 independent observers. In line with comparative policy research, the survey focused on representatives of the political-administrative system and observers (cf. Obinger 2009; Schubert/

Bandelow 2009). Since the aim of this comparative research project was not an original evaluation of cluster policies in three federal states and seven sub-state regions, addressees of cluster policies, most notably firms and research organisations, have not been included in the survey.

Since the survey covered the federal and state levels as well, interviews were restricted to the three states of Bavaria, North Rhine-Westphalia (NRW) and Lower Saxony, which accounted for 53, 44 and 35 interviewees respectively. A further 13 experts were active in more than one state or at the supra-state level more generally. At the state level, North Rhine-Westphalia, Bavaria and Lower Saxony were chosen to roughly represent three economically distinct types of region. While structural policy in North Rhine-Westphalia has for decades been dominated by the challenge to promote structural change in the Ruhr area, Bavaria stands for the opposite case of a late industrialised state with a strong presence of high-tech industries. With its manufacturing sector shaped by Volkswagen (VW) and its supplier network, Lower Saxony appears quite unlike these two extremes, falling rather into the 'grey mass' category of regions that do not fit into the stylised dichotomy of the "bad" and the "beautiful" (Boschma 2004: 1012) and are thus often neglected in regional studies. This choice of states was meant to create structural, but also institutional and political variety for the interregional comparison of cluster policies. Mapping the sub-state case studies, Fig. 3 illustrates their varying size stretching from the City of Regensburg as a single urban municipality with 131,000 inhabitants to horizontal coalitions of counties and urban municipalities like the regions of Hannover, Braunschweig and Nuremberg, whose populations range from 1.1 million to 1.7 million inhabitants.

Case studies have been selected according to the seven dimensions of cluster policy introduced in Sect. 2. In the



Fig. 3 Map of case study regions in three federal states. (Cartography: Stephan Pohl)

governance dimension, the focus on cluster policy requires a significant degree of public agency in the initiation, funding and operational governance of the effort. Despite embracing the cluster notion, the policies under study do not have to use the cluster term explicitly—in many German regions there is a tendency to adopt more ‘neutral’ terms like fields or networks of competence instead. Although cluster concepts often cite Porter’s definition of a cluster, there is generally little deeper theoretical grounding, and practitioners tend to understand clusters as organised networks of firms and research organisations (cf. Kiese 2012: 324 ff.). However, the selected cases all have a substantial degree of cluster orientation when measured by the usage of cluster-specific versus generic economic development tools. They are complex in combining wider sets of instruments for cluster promotion and coherent by uniting different policies and regional stakeholders within a single programme. Institutionalisation may vary from rather loose associations to dedicated cluster management organisations, but all cases are sufficiently mature to allow for some at least preliminary evaluation. It is necessary to point out that the selection of case studies was designed to create a variety of institutional settings for comparative cluster policy research more broadly. Since

the fieldwork predated the economic crisis starting in 2008, the idea of regional resilience that gained prominence in its aftermath did not inform case study selection.

In *North Rhine-Westphalia*, the most ambitious regional cluster policy effort can be found in Dortmund, Germany’s eighth largest city on the eastern edge of the Ruhr conurbation that has embraced pro-active structural change ever since the establishment of its innovation centre and technology park in the mid-1980s. In 2000, the city council approved a cluster strategy devised by McKinsey & Co. targeting IT, micro technologies and e-logistics to compensate for the demise of coalmining, steelworks and breweries. As a second sub-state case within North Rhine-Westphalia, the *kompetenzhoch3* collaboration between the city triangle of Wuppertal, Solingen and Remscheid was also driven by the legacy of early industrialisation and a pressing need for structural change. Since 2001 the three municipal economic development offices have established a division of labour based on five fields of competence, namely automotive, metal processing, product development and design, event management and communication, as well as health and personal care (cf. Dewald 2006). While Dortmund’s strategy entails a radical break with the past, *kompetenzhoch3* includes an injection of design competencies into the remains of the centuries-old cutlery district of Solingen and Remscheid, which was prominently analysed by both Marshall and Porter (cf. Bathelt 1998; van der Linde 1992: Chap. 8).

As the most important case of regional cluster policy in *Bavaria*, the southern state’s second-largest city Nuremberg devised its first cluster strategy in response to the decline of its dominant electrical engineering sector in the early 1990s. Initial efforts were incorporated in the more coherent Nuremberg Programme in 1994, which was followed by a consensual perspective report originally drafted and signed in 1998, and renewed in 2005 (cf. Neumann 1996; IHK Nürnberg für Mittelfranken 2005), at the same time expanding its spatial outreach to encompass the entire district of Central Franconia surrounding Nuremberg. These documents contained portfolios of fields of competence defined as clusters, which are promoted through independent competence initiatives founded successively from 1994 (cf. Heidenreich 2005). In contrast to Central Franconia’s experience of industrial decline, the city of Regensburg witnessed a rather exceptional late industrialisation from the 1980s following the attraction of large manufacturing establishments like BMW and Siemens. In boom-town Regensburg municipal cluster policy emerged in response to federal government contests, starting with the city’s bid in the federal government’s BioRegio contest (cf. Dohse 2007), which failed to secure funding but eventually led to the establishment of the BioRegio Regensburg cluster initiative in 1996 and the BioPark incubator in 1999. A similar top-down stimulus triggered the establishment of the Strategic Partnership for Sensor Technology in 2003, a concept transferred locally

to the field of IT security in 2006 (cf. Stadt Regensburg 2003, Diefenthal 2006).² From their Regensburg base, both partnerships quickly expanded throughout Bavaria, while the sensor technology initiative was even officially charged with state-wide cluster management as part of the state government's cluster policy (cf. Kiese 2012: 193 ff.).

Unlike North Rhine-Westphalia and Bavaria, the state of *Lower Saxony* does not pursue an explicit and coherent cluster strategy, but adapted a McKinsey & Co blueprint to revamp its regional structural policy in 2004. At its heart, so-called Regional Growth Concepts (RGCs) are designed to stimulate the bottom-up development of regional cluster policies (cf. Kiese 2012: 236 ff.). The approach is modelled on the above-mentioned dortmund-project and the older AutoVison concept developed in 1998 by McKinsey on behalf of VW to reverse the economic fortunes of their headquarter and company town in Lower Saxony, Wolfsburg. As well as cutting local unemployment by half within 5 years, which was achieved with the help of a cyclical upswing, the local cluster organisation Wolfsburg AG aims in the long run to transform the traditional single-plant location into a self-augmenting mobility cluster. To reduce the overwhelming dependency on one single employer, the concept proposed the development of new interlinked clusters of IT, leisure and tourism, as well as health services (cf. Sternberg/Kiese/Schätzl 2004). As a prototype of its newly-conceived Regional Growth Concepts, the state government teamed up with the city and region of Hannover to commission McKinsey & Co. to develop a cluster-based strategy to improve the competitiveness of its capital region in 2002. In 2003, local and regional governments jointly incorporated hannoverimpuls as a new economic development agency to pursue their strategy built on the development of automotive, IT, life sciences, optical technology and manufacturing technologies into working and interlinked clusters (cf. Kiese 2008b). In the meantime, the state co-funded the development of a similar McKinsey concept for the Braunschweig region, which has been pursued by the project Region Braunschweig GmbH since early 2005 (cf. Prätorius 2004). In 2013, that project was finally integrated with the Wolfsburg AG, since Wolfsburg is one of the eight administrative units that make up the Braunschweig region.

4 Empirical Findings

This section presents case study evidence on those dimensions that have been singled out as relevant for the organising capacity that may ultimately translate into improved regional resilience. Section 2 identified coherence and

complexity as the main prerequisites for cluster policies to enhance a region's organising capacity, while governance and institutionalisation were also deemed influential. On the other hand, cluster orientation was rather interpreted as an outcome, or indicator, as well as maturity which may also have a reinforcing impact. Just like cluster reference, these two dimensions are documented elsewhere (Kiese 2012: 304 ff.) and not reported here, since it is not plausible to assume a substantial impact on the organising capacity of regions.

4.1 Dimensions of Cluster Policies

4.1.1 Governance

The governance of regional cluster policy includes aspects of initiation and funding and is a reflection of regional governance structures combined with horizontal and vertical interactions, i.e. with neighbouring regions and superordinate levels of governance. According to the degree of their involvement, actors may be divided into shareholders and stakeholders (see Table 1). Shareholders commit financial resources to the equity and/or the operating costs of a cluster management organisation, and their support extends beyond individual projects. By contrast, stakeholders are more loosely involved through e.g. advisory committees, or their involvement is restricted to individual projects. Since we used substantial public agency as a definitional criterion of cluster policy, it is little surprising that all seven case studies of regional cluster policy are mainly initiated, funded and governed by counties and municipalities. Looking solely at stakeholders, the cases of Dortmund, *kompetenzhoch*³, hannoverimpuls and Regensburg are purely state-driven. The Wolfsburg AG represents a typical public-private partnership as the cluster management organisation is jointly owned by Volkswagen and the city of Wolfsburg, while the constellations of shareholders are much broader in the mature industrial regions of Braunschweig and Nuremberg, representing tripartite alliances between local government, the business sector, and trade unions. While there is a clear asymmetry of power with VW setting the agenda in Wolfsburg and Braunschweig, the Nuremberg case is characterised by a lengthy process of consensus building in which the resulting cluster portfolio represents a classical compromise between the three parties involved.

The constellation of actors is linked to the type of economic region and the specific starting conditions and motivations for initiating cluster policies. Cities and regions with strong but declining manufacturing bases typically have stable and established networks of actors, described as the "weakness of strong ties" by Grabher (1993) for the Ruhr area. The fact that cluster policies first emerged in response to structural crises in manufacturing regions supports the deci-

² See also <http://www.it-speicher.de/kompetenz/5543-106,1,0.html> (24.02.2014).

Table 1 Constellation of actors in regional cluster policies. (Source: translated from Kiese 2012: 304)

	Dortmund	Wuppertal-Solingen-Remscheid	Wolfsburg	Hannover	Braunschweig	Central Franconia	Regensburg
Counties and municipalities	●	●	●	●	●	●	●
Large firms			●	○	●	○	○
Small and medium enterprises	○	○		○	●		○
Chambers and associations	○	○		○	●	●	
Trade unions	○		○	○	●	●	
Universities	○			○	○		○

● = Shareholder, ○ = Stakeholder (e.g. involved through advisory board)

sion by van den Berg/Braun/van der Meer (1997) to include ‘spatioeconomic conditions’ in their model of organising capacity (cf. Sect. 2). Further to the scope of actors involved, the participation of trade unions is another feature of cluster policies in manufacturing regions. In the cases of Dortmund, Braunschweig and Nuremberg, trade unions provided critical conceptual impulses for the initiation of cluster policies, but their governance impact was rather limited by shrinking human and financial resources as a result of an eroding membership base (cf. Dörre/Röttger 2006). Contrasting the scope of actors and the engagement of trade unions, business participation appears unrelated to the type of economic region. As illustrated by VW’s dominant role in Wolfsburg and the wider Braunschweig region and the contrasting problems of mobilising firms beyond individual projects in the Hannover case (cf. Kiese 2008b), this rather seems to be a function of soft factors, such as the region’s political economy or culture.

The cluster policies of Dortmund, Wolfsburg and Central Franconia emerged bottom-up, i.e. from within these regions. In the other four cases, bottom-up initiative was triggered by incentives from higher governance levels in a counter-current fashion. These top-down impulses include Lower Saxony’s Regional Growth Concepts for the regions of Hannover and Braunschweig, a regional development contest “Regionale 2006” in North Rhine-Westphalia for the city triangle (cf. MBV/ILS 2006), and federal government contests including BioRegio or a competition to promote strategic partnerships between firms and municipalities in the case of Regensburg.

4.1.2 Coherence

The coherence dimension captures the integration of actors and measures, which can range from a plethora of isolated activities pursued by competing actors to integrated and all-encompassing concepts uniting all actors towards a common objective. In this dimension, the seven case studies display considerable variety. While the promotion of biotech, sensor technology and IT security in Regensburg appears independent, connected only by the urban municipality as the key initiator, the similarly decentralised competence initiatives in Central Franconia are at least linked strategically through

the regional perspective report. Coherence is also rather limited in the city triangle of Wuppertal-Solingen-Remscheid, since the three municipalities divided the responsibilities for the five fields of competence, despite the new regional development agency. A medium degree of coherence can be found in the regions of Hannover and Braunschweig, where institutional overlap tended to hamper a fully coherent cluster policy, at least for many years. However, these restrictions do not apply to the cases of Dortmund and Wolfsburg, which may thus be seen as examples for highly coherent policies.

4.1.3 Complexity

Cluster promotion may rely on single measures or employ a combination of many different instruments, which is captured by the complexity dimension. Since this dimension was used to select the case studies, along with governance and maturity, it is hardly surprising to find relatively complex, i.e. multi-dimensional approaches combining various instruments in all seven regions. As for coherence, the most complex approaches can be found in Dortmund and Wolfsburg where cluster policy is interpreted so broadly that it stretches into the field of urban development and planning. Consequently, Dortmund is referred to as a case of strategic urban development planning by Ziesemer (2004), while Wolfsburg’s cluster policy is discussed as a case of urban governance by Pohl (2005). Not much less complex are the approaches devised by McKinsey & Co. in the Hannover and Braunschweig regions, where the consultants’ concept produced broad sets of projects and instruments, which were modified and supplemented after the initial concept had been drawn up. When compared to these cases, the complexity of cluster policies in the city triangle, central Franconia and Regensburg appear rather medium.

4.1.4 Institutionalisation

Contrasting most other dimensions, the institutionalisation of cluster policies appears unrelated to the type of economic region. Indeed, the variety of organisational forms indicates a considerable degree of strategic freedom. Advocated by McKinsey & Co., the standard approach of establishing

a new development agency to implement the cluster concept was adopted in Wolfsburg, Hannover and Braunschweig, although in the latter case two existing organisations became integrated in the new one. In Dortmund, a project team was formed within the municipal administration reporting directly to the Mayor, but after 5 years this was integrated into the city's sizeable economic development office. Despite the similarity of these approaches, only the Wolfsburg and Braunschweig cases managed to integrate the business sector as shareholders when setting up their agencies as public-private partnerships. Although this is only the most formal form of business engagement in cluster policy, it does suggest that there is ample scope to increase the regions' organising capacity through a greater mobilisation of private sector involvement.

While dedicated legal entities charged with promoting the development of entire cluster portfolios represent the highest conceivable degree of institutionalisation, decentralised competence initiatives to support individual clusters have been successively formed in the Nuremberg region since 1994. Most of them were organised as associations and run by a cluster or network manager. The weakest forms of institutionalisation can be found in Regensburg and in Wuppertal-Solingen-Remscheid. While Regensburg runs its BioRegio as a municipal limited liability company, its strategic partnerships for sensor technology and ICT security became more strongly institutionalised over time as they were transferred from memoranda of understanding into associations. In the city triangle, cluster policy is implemented in a division of labour between the three municipal economic development units, despite the newly-formed regional development agency (Table 2).

4.2 Impact on Organising Capacity of Regions

While we still know very little about the actual economic impact of regional cluster policies, our case studies provide

ample evidence that they do indeed enhance the organising capacity of regions, which we assume to improve regional resilience.

In the case of *Dortmund*, cluster policy led to a significant modernisation and professionalisation of the city's economic development agency. This was achieved through a focus on clusters and project-based work, the accumulation of know-how in the set-up and operation of ten mainly cluster-specific business incubators, as well as the organisation of the start-up contest "start2grow" which was held 31 times between 2001 and 2013. Although the majority of start-ups supported through these contests were located outside the ICT and microtechnology clusters, and even outside Dortmund, the dortmund-project led to a measurable improvement in the city's entrepreneurship ecosystem. In a ranking of all 439 German counties and urban municipalities by entrepreneurial activity, Dortmund jumped from bottom to top within the Ruhr area between 1999 and 2007 and occupied the 58th rank in 2007 (Stadt Dortmund 2009: 5). Between 1998 and 2006, the number of new firm registrations per 1,000 inhabitants increased by 49.5%, clearly outperforming all other counties and urban municipalities in the Ruhr conurbation, as well as the region as a whole where registrations only increased by 19% (Maretzke 2008: 576). Practitioners and observers from other parts of the Ruhr area have also envied Dortmund's ability to attract public funding for economic development projects over the previous decade, mainly for urban regeneration and incubator facilities. The most prominent example is the conversion of a former steel mill site into a new technology park that attracted more than 100 million € from the EU and the state of North Rhine-Westphalia, including the microtechnology incubator MST.factory with its cleanroom facilities (Röllinghoff 2008: 174). Although organising capacity is hardly measurable, the ability to attract funding—especially in competitive procedures—may serve as a decent proxy. Based on a pre-existing broad coalition of stakeholders that became

Table 2 Dimensions of cluster policy: Overview of regional case studies

	Governance	Coherence	Complexity	Institutionalisation
Dortmund	Public; bottom-up; initiative by large firm; civic foundation	High	High (⇒ urban development)	Project team ⇒ municipal local economic development office
Wuppertal- Solingen- Remscheid	Public; bottom-up	Medium	Medium	Co-operation of municipal local economic development units
Wolfsburg	Bottom-up; public-private-partnership (50% VW, 50% City)	High	High (⇒ urban development)	Cluster management organisation
Hannover	Public, with private sponsoring for projects; counter current	Medium	High	Cluster management organisation
Braunschweig	Tripartite; counter current	Medium	High	Cluster management organisation
Nuremberg	Tripartite, bottom-up	Medium	Medium	Competence initiatives with cluster managers
Regensburg	Public; counter current	Low	Medium	Co-ordination by municipal local economic development office; strategic partnerships ⇒ associations

known as the “Dortmund consensus” and that had already facilitated the establishment of one of Germany’s earliest innovation centres in 1985, the dortmund-project may be seen as another catalyst for the city’s organising capacity.

In a similar fashion, cluster policy contributed to organising capacity in *Wuppertal*, *Solingen* and *Remscheid*. Since kompetenzhoch³ involved three urban municipalities, its main institutional benefit may be seen in a further erosion of territorial egoism (*Kirchturmdenken*). This process led to the establishment of the regional development agency *Bergische Entwicklungsagentur* in October 2007, which unites the three municipalities, their local savings banks (*Sparkassen*) and the regional chamber of industry and commerce as stakeholders. The agency is charged with the development and networking of regional projects, with acquiring EU and state funding and lobbying the state government (Middeldorf 2009: 42). However, for the chamber of industry and commerce representing firms from all three cities, the new agency is merely one step towards a closer integration of Wuppertal, Solingen and Remscheid into one economic region (Wenge/Sträter 2009: 32). While the state government’s attention to the region has been strengthened, the chamber stresses that inter-municipal co-operation still leaves much to be desired (Wenge/Sträter 2009: 34). So far, only Solingen has transferred a position for tourism promotion to the regional agency, while the *Entwicklungsagentur* mainly focuses on attracting funding. Collaborative efforts in economic development remain confined to a few projects, such as a common concept for industrial real estate with inter-municipal estates.³ Given the long tradition of intra-regional competition, parochial thinking is still latent in the region and lamented by regional organisations such as the chamber of industry and commerce.

Following the Grundig crisis in 1992, a long process of consensus building led to the Nuremberg Programme (*Nürnberg-Programm*) being formulated in 1994 and updated as an overall concept (*Leitbild*) of regional development in 1998 and 2005. This process contributed to a transformation of regional identities and governance structures that culminated in the formation of the European Metropolitan Region of Nuremberg, which gained official recognition in 2005. It also strengthened the region’s organising capacity that allowed Central Franconia to attract a disproportionately high share of state government funding, a likely outcome of organising capacity directly comparable to the Dortmund case. The Bavarian state government’s High-Tech-Offensive alone funded around 70 projects in Central Franconia with a combined volume of around 380 million € (Heidenreich/Miljak 2005: 110). The region’s cluster initiatives also increased the economic development agencies’ acceptance

among local firms and helped mobilise business involvement in networking projects (Küpper 2008: 89).

In the case of *Hannover*, the main impact of cluster policy on the region’s organising capacity can be found in the professionalisation of entrepreneurship support and a reduction of institutional overlap. Before the foundation of hannoverimpuls, some 30 regional organisations provided advice to start-ups, which is now much more co-ordinated. Institutional overlap initially increased when hannoverimpuls was set up in 2003, but was then reduced through a holding structure comprising economic development, marketing and tourist promotion in 2008. In April 2011, this holding was merged with hannoverimpuls under the latter’s name.⁴ By focusing on five focus industries, the region’s marketing effort was able to communicate a clear profile within and outside the region for the first time, which also contributed to organisational capacity.

In the *Braunschweig* region, the emergence of various initiatives from the mid-1980s can be attributed to the region’s strong dependence on the automotive industry and the resulting vulnerability to cyclical downturns (cf. Blöcker/Jürgens/Meißner 2009: 79). The ensuing processes of regionalisation improved the region’s organising capacity in the early 1990s through the formation of the inter-municipal Zweckverband Großraum Braunschweig and the regional development agency reson e. V., which was initiated by the trade union IG Metall and VW’s Works Council, who pressed VW to support it as well. These two organisations jointly produced a concept for regional development in 2001. As part of this process, the vision of Braunschweig as a region for transport competence emerged (cf. Lompe/Blöcker/Lux et al. 1996), but also more than 100 uncoordinated concepts for different sub-regions, industries or even firms. Consequently, there was no need for further analysis, but a clear perception of an implementation deficit in the region’s economic development industry (cf. Prätorius 2004: 55; Warnecke 2008: 248). The formation of the project Region Braunschweig GmbH in 2005 and its most recent integration with the Wolfsburg AG (2013) clearly helped improve the region’s organising capacity, progressing from producing papers to implementing projects. However, there is still a strong dependence on the region’s dominant carmaker VW for funding.

It should be stressed though that the link between cluster policies on the one hand and organising capacity or regional resilience on the other is by no means unilateral. As examples of crisis-induced regional cluster policies such as Nuremberg, Dortmund or Wolfsburg illustrate, cluster policies emerged in response to shocks and are thus an indicator and outcome of pre-existing organising capacity (e.g. the “Dortmund consensus”) and hence of regional resilience. Cluster policies should

³ <http://www.rp-online.de/bergisches-land/remscheid/nachrichten/wirtschaftsfoerderung-bleibt-lokale-aufgabe-1.1682903> (20.02.2014).

⁴ See http://www.hannoverimpuls.de/news/index.php?we_objectID=1563&pid=2009 (20.02.2014).

therefore not be seen as an independent driver, but as an integral part of the organising capacity of regions.

4.3 Cluster Policy Portfolios Between Specialisation and Variety

ICT, biotechnology and the wider field of health services are the main sectoral focus of cluster initiatives both worldwide (Sölvell/Lindqvist/Ketels 2003: 4) and among Germany's federal states (cf. Kiese 2012: 232). Their popularity is also evident across the seven regional case studies reviewed here. Marking the strong presence of the automotive industry and the related complex of mechanical engineering and process technologies in Germany as a whole, this sector also emerged as a prime target of cluster policies in many regions. Reflecting a certain degree of herd behaviour, the simultaneous promotion of clusters in the same industries and technologies is unlikely to yield competitive clusters in all regions, especially when cumulative effects and first-mover advantages are taken into account. However, bandwagoning does not lead to a full convergence of cluster portfolios, which still reflect considerable variety across regions according to their previous patterns of specialisation.

With regard to resilience, the critical question is to what extent a region's cluster portfolio is likely to foster narrow regional specialisation, unrelated variety based on a diversity of rather different activities, or related variety combining different industries and technologies that share a common knowledge base allowing inter-industry (Jacobian) knowledge spillovers (cf. Glaeser/Kallal/Scheinkman et al. 1992; Frenken/van Oort/Verburg 2007; Asheim/Boschma/Cooke 2011). Defining clusters as sets of related industries, Porter (2003: 562) argued that a variety of overlapping clusters should lead to a better economic performance of a region

than a diverse array of unrelated clusters. His United States Cluster Mapping Project used modified locational correlations to group industries into 41 traded clusters, each comprising about 29 industries on average. Overlap of clusters sharing the same industries was so common that on average each industry was found to be part of about two clusters.

Our data on the cluster policy portfolios of seven German regions does not allow for a distinction between industries and clusters as in Porter's analysis. In addition to a uniform definition of clusters, this would require regional cluster policies to clearly define the boundaries of their target clusters using statistical industry classifications. In practice, cluster policy portfolios mix industries and technologies without any regard for congruence between the two or their combination to form clusters. In the absence of such data, we are confined to a rather intuitive classification of the seven regions' cluster policy portfolios into the broad categories of specialisation, related variety and unrelated variety. From the regions' cluster policy portfolios it is evident that none of the case study regions pursues a strategy of narrow specialisation that would undermine their capacity for resistance and recovery. However, it appears possible to classify and rank the regions' varied cluster policy portfolios according to their intuitive degree of relatedness, which is listed in descending order in Table 3.

The Nuremberg region's cluster policy portfolio appears to display most relatedness in its variety, mainly due to its emphasis on cross-sectional technologies that may potentially induce substantial spillovers into other industries. The resilience literature would suggest that this benefits the region's capacity for renewal and re-orientation, which it had already proven when the sudden decline of manufacturing employment struck in the early 1990s. The strong focus

Table 3 Cluster policy portfolios of regional case studies. (Source: based on Kiese 2012: 313)

City/Region	Cluster Policy Portfolio	Classification
Nuremberg (Central Franconia)	Unrelated: medical technology and health services Mainly linkages through cross-sectional technologies: Transport and logistics, ICT, energy and environmental technologies, new materials, automation and process technology, "innovative services"	Related variety
Braunschweig Region	Automotive and related: mechanical engineering, new materials, IT, transport safety Others: environmental engineering, financial services, tourism	Variety with relatedness
Hannover	Automotive, life sciences Some linkages through cross-sectional technologies: IT, optical technology, manufacturing technologies	Variety with some potential for relatedness
Wolfsburg	Related: Automotive, IT Unrelated: Leisure and tourism, health services	Variety with some relatedness
Dortmund	Micro technologies, e-logistics, biomedical = unrelated, but potential linkage through IT	Unrelated variety
Wuppertal-Solingen-Remscheid	Automotive, event management and communication, health and personal care = unrelated Potential linkage between metal processing and product development/design	Unrelated variety
Regensburg	Biotechnology, sensor technology, IT security	Unrelated variety

on cross-sectional technologies may furthermore reduce Central Franconia's resistance to external shocks.

Through the combination of their traditional strengths in the automotive industry and some cross-sectional technologies, such as IT, the degree of relatedness is roughly medium for the three cases from Lower Saxony. Within this sub-sample, relatedness appears to be most pronounced in the Braunschweig region and clearly less so in Wolfsburg, which is part of the former of course. Beyond relatedness, these three regions show some attempts at diversification into areas which are at first sight unrelated to their core competency in automotive, such as life sciences in Hannover or health, leisure and tourism in Braunschweig and Wolfsburg. In the case of Wolfsburg, however, attempts at *industrial* diversification into tourism are led by VW's flagship automotive theme park *AutoStadt*, attracting around two million visitors per year (cf. Wachs 2008), which obviously reinforces the city's automotive *cluster*. It thus provides a typical illustration of diversification across industries within the same cluster. At the other end of the scale, the variety exhibited in the cluster portfolios of Dortmund, Wuppertal-Solingen-Remscheid and Regensburg appears rather unrelated. In Regensburg, this unrelatedness resulted from responses to unrelated federal government contests. In Wuppertal-Solingen-Remscheid, unrelatedness reflects a political bargaining process in which each of the three municipalities wanted to have its leading industries included (cf. Dewald 2006).

4.4 Cluster Policy Portfolios and Regional Economic Resilience

Though regional economic resilience is not part of our empirical investigation, we consider it useful to outline three theoretical assumptions on how cluster policy portfolios could affect regional resilience, based on the four dimensions of resistance, recovery, renewal and re-orientation introduced by Martin (2012). Furthermore, we expect this effect to be mediated by the variety of a region's industry structure as shown in Fig. 2.

From a theoretical perspective, specialised regions are likely to particularly promote incremental innovation and process innovation due to the impact of localisation economies as highlighted by Marshall, Arrow and Romer (cf. Glaeser/Kallal/Scheinkman et al. 1992). We therefore assume these regions to be more exposed to sector-specific shocks and less likely to recover quickly from a temporary disruption due to the shortage of employment opportunities in other (undisturbed) sectors (cf. Boschma/Eriksson/Lindgren 2013).

In contrast, we expect the opposite for regions characterised by unrelated variety, i.e. a portfolio of industrial sectors that do not share complementary competencies (cf. Boschma/Iammarino 2009: 293). Hence, unrelated variety may

be assumed to protect a region from substantial job losses potentially caused by sector-specific shocks for two reasons. On the one hand, sector-specific shocks are unlikely to disturb the regional economy as a whole, since there are no substantial input-output-linkages between regional industries (cf. Boschma/Iammarino 2009: 293). On the other hand, job opportunities in further (undisturbed) sectors improve the prospects of a widely efficient relocation of labour (cf. Boschma/Eriksson/Lindgren 2013: 7). Moreover, the positive impact of unrelated variety on a region's resistance has been confirmed by the recent empirical work of van Oort/de Geus/Dogaru (2013).

In regions characterised by related variety with a portfolio of industries that are related in terms of shared or complementary competences (Boschma/Iammarino 2009: 292), impacts on resilience are supposed to vary accordingly. On the one hand, it is argued that the relatedness of industries facilitates the spreading of economic disturbances and consequently impairs a region's resistance to shocks (cf. Ellison/Glaeser/Kerr 2010). On the other hand, related variety is assumed to support product innovation and radical innovation in particular, as the recombination of knowledge bases from interconnected sectors tends to facilitate the development of new products or technologies (cf. Frenken/van Oort/Verburg 2007). Furthermore, we expect this interplay to raise the long-term ability of regions for continuous economic renewal and, if necessary, also re-orientation. The positive impact of related variety on product innovation has been identified by van Oort/de Geus/Dogaru (2013).

Linking this background to different types of cluster portfolios eventually leads us to three basic assumptions. First, a narrow cluster portfolio supports economic specialisation and consequently lowers a region's ability to resist and recover from economic shocks. Second, a broad cluster portfolio promotes unrelated variety and consequently enhances a region's ability to resist economic shocks. Third, a broad and related cluster portfolio stimulates related variety and thereby reduces a region's ability to resist economic shocks, while at the same time enhancing a region's capacity for economic renewal and re-orientation.

5 Conclusions and Outlook

In this paper, we started from the proposition that cluster policies may contribute to regional resilience by strengthening a region's organising capacity. We developed a multi-dimensional model of cluster policy, identifying the dimensions that are critical to a region's organising capacity. The contribution of cluster policies to regional resilience depends on the nature of cluster policy portfolios, which may foster greater regional specialisation on the one hand, or greater unrelated or related variety on the other. We

then presented evidence from seven case studies of regional cluster policies in Germany to assess how and under what conditions these policies can strengthen a region's organising capacity to ultimately improve its resilience. Our results show that all cases contributed to organising capacity albeit to different degrees, supported by varying though at least medium degrees of bottom-up governance, coherence, complexity and institutionalisation. However, the majority of cases display a tendency for cluster orientation to decline over time for reasons of political and bureaucratic rationality outlined elsewhere (cf. Kiese 2008a; Kiese/Wrobel 2011). While it still remains a challenge to measure any causal impact of cluster policies on regional economic performance (cf. Kiese 2009), there is multiple evidence that cluster policies do contribute to a region's organising capacity through reinforcing regional governance structures, as well as through a professionalisation and strategic focusing of economic development services. However, the most successful and mature regional cluster policies build on an already established organising capacity, which make them look like the egg rather than the chicken.

We also ranked our case studies according to the contribution of their cluster portfolios to specialisation versus variety, finding different degrees of relatedness that cast some doubts on the usefulness of discrete categories. However, Central Franconia's cluster portfolio comes closest to promoting related variety, which would increase the region's capacity for renewal and re-orientation at the expense of its resistance to external shocks. On the other hand, three regions were found to promote rather unrelated sets of clusters, which should improve their resistance to external shocks.

The widespread decline of cluster orientation during implementation calls for cluster policies to be based on more rigorous and unprejudiced analyses of actual cluster potential. In practice, many regions indeed targeted policy-driven or even wishful-thinking clusters (cf. Enright 2003). It would make sense though to recommend clusters as an analytical tool and strategic device for understanding regional economies and organising collective action, rather than as an ideal outcome of economic development efforts—as evident from the world-wide quest to produce the next Silicon Valley (cf. Bresnahan/Gambardella/Saxenian 2001; Rosenberg 2002; Kiese 2012: 335 f.). It may help regional cluster policy and practice to include the procedural benefits for organising capacity in their sets of targets, although this is clearly a precondition as much as an end. Similarly, the issue of relatedness and their potential impacts on regional resilience have to date not been taken into account in the design of cluster policies and the selection of cluster portfolios. For cluster policies to have sustainable impact, constant monitoring and independent (including scholarly) evaluation is needed to ensure they remain adaptive to gradual and dis-

ruptive changes in the environment, whether such changes be social, economic, political or technological.

As often, the research presented here raises more questions than it answers. First, there is still the unresolved challenge to evaluate the actual impact of cluster policies on regional economic performance, including resilience. Even our modest attempt at shedding light on their contribution to organising capacity yielded little more than anecdotal evidence. More systematic research into this link is needed, since the fieldwork processed here predates the recent discourse on regional resilience and originally followed a different set of questions, identifying impacts on organising capacity as a by-product. It would thus be necessary to find more than just proxies (like the ability to attract funding) to measure organising capacity and the impact of cluster policies on it. Within the context of resilience, a fruitful line of empirical inquiry relates to the examination of the extent to which cluster portfolios as displayed in Table 3 contribute to either greater specialisation or variety, related or unrelated, and whether this process has a significant impact on regional economic resilience. This would obviously require a clear delineation of cluster portfolios according to standard industrial classifications, which cluster policies do not provide. Integrating cluster life cycle aspects (cf. Menzel/Fornahl 2010), which was beyond the scope of the present paper, would take this line of research even further.

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