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Regional Cluster Policies in Germany - A Multi-Level Governance Perspective on Policy Learning

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Despite common reference to the cluster concept and some signs of policy convergence, cluster policies differ markedly, reflecting industry characteristics and institutional differences at various spatial scales, or levels of governance. This paper uses the case of Germany to illustrate the variety of regional cluster policies in a federal state. It particularly focuses on the relations, interdependencies and divisions of labour between four levels of governance. Policy learning can be observed either within or between regions and levels of governance, and the evidence shows that path-dependent incremental learning dominates while interregional learning is restricted to certain windows of opportunity.[1]

Cluster Policy, Policy Diffusion, Policy Learning, Multi-level Governance, Germany

1. Introduction

Over the past two decades, policymakers and practitioners' enthusiasm for clusters and regional networks of firms and research institutions has surged far ahead of our theoretical and empirical understanding of the phenomenon. Repetitively pointing at the still unsatisfactory evidence of the innovation and productivity edge of clusters has certainly not made advice to policy and practice any easier. The recent emergence of cluster policy research as a new interdisciplinary field may thus be seen as a scholarly attempt at turning the tables on policy and practice by moving those spheres, including their specific actions and incentives into the research focus. The results will hopefully help academics to package their knowledge more elegantly to deliver advice that no longer goes unheard outside the ivory tower.

Despite this spark of hope, research on clusters and related concepts like industrial districts, innovative milieus or learning regions has for far too long focused on intraregional sources of dynamics while neglecting a cluster's external dimension (cf. MASKELL/MALMBERG 2002). While this blindness has apparently been overcome, the emerging field of cluster policy research is currently in danger of falling for the same trap. With its focus on single-case studies and a noticeable drive to extract policy recommendations from perceived best-practice cases, the majority of accounts fail to acknowledge the complexity of horizontal and vertical governance issues that cluster policies entail.

This paper traces learning processes in cluster policies from a multi-level governance (MLG) perspective. It uses the case of Germany, a federal country whose devolution of power has led to a plethora of cluster policies at the state and sub-state level. To varying extents, they are influenced by the supranational level of the European Union and the national level of federal government, adding up to four different levels of governance to be taken into account.

[1] An earlier version of this paper has been presented at the Research Colloquium on "Cluster Policy in European Regions: Governance, Innovation and Actor Interactions" at the Audencia Nantes School of Management, October 5-6, 2009. The author gratefully acknowledges constructive comments from discussants, but the usual disclaimer applies.

After introducing cluster policy as an issue of multilevel governance, we outline the nature of cluster policies at these four levels, resorting to case studies when scaling down. We then focus on policy learning with the ultimate aim of weighing vertical learning between the different scales against horizontal and intra-regional policy learning. Implications for policy and research will conclude our discussion.

2. Cluster Policy, Multi-Level Governance, and Policy Learning

Since the mid-1990s, the cluster concept enjoys continuing popularity with academics, politicians and economic development practitioners alike. PORTER (1998: 197 f.) defines 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". 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 received a fair share of scholarly criticism, of which MARTIN/SUNLEY (2003) is still the sharpest piece 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 all established wisdom on cluster genesis and evolution (cf. BRAUNERHJELM/FELDMAN, 2006).

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 (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 cluster firms assume centre stage, supported by government and/or research institutes (cf. SÖLVELL *et al*. 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 was already highlighted by FROMHOLD-EISEBITH/EISEBITH (2005), KIESE (2008B, p. 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 by 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.[2] Despite subtle variations in meaning, their common reference to the cluster concept is obvious.

Cluster orientation: A policy strategy in support of regional innovation and growth rarely focuses on cluster 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. 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, p. 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.

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.

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.

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, while the creation of a dedicated cluster management organisation (CMO) represents the strongest form of institutionalisation, with the main stakeholders expressing their commitment by becoming shareholders.

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 already completed? Highlighting the process character of cluster policy obviously calls for an evolutionary perspective accounting for path-dependency and cumulative learning.

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, MAINTZ (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 matches the complex constellation of actors in clusters, but also reflects a shift 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.

Since most clusters do not extend beyond the sub-national scale,[3] cluster policies may be best associated with issues of regional governance at first sight (cf. DANSON 1997, DANSON *et al*. 2000). However, regional cluster policies are rarely isolated from national and supranational policies, leading to complex interrelations across the different levels of

[2] For an account of the systematic variations of cluster policy between Germany, France and the UK see KIESE (2009).

[3] Reviewing evidence on 833 clusters world-wide, the Harvard Business School's Cluster Meta Study found that out of 705 clusters whose territorial dimension was reported, only 6.5 per cent stretched across an entire nation or even beyond national boundaries (cf. VAN DER LINDE 2002: 10).

governance. Cluster policies are thus a pivotal case of MLG connecting all scales from the supranational via the national to the regional (sub-national) and local (municipal) level.[4] However, by focusing on vertical relationships *between* different governance levels, the MLG approach tends to neglect the increasing density of horizontal partnerships, networks and collaborative institutions *within* a governance level, accumulating to form a complex set of policy linkages in what SKELCHER (2000) refers to as the "congested state" of governance plurality. There is probably not better case to illustrate and explore cluster policies within a MLG framework than Germany which is not only highly decentralised by international standards, but also integrated into the EU's supranational governance structures. Historically, Germany owes its decentralised constitutions to the allied forces desire to prevent a recentralisation of power after World War II. However, rather than realising the dynamic benefits of competitive federalism among the 16 states, or *Länder*, the system evolved into a co-operative federalism with increasingly complex interdependencies between the federal and the state level which is referred to as *Verflechtungsfalle*, or interdependence trap (BERTHOLD 2005, KIRCHGÄSSNER 2008).

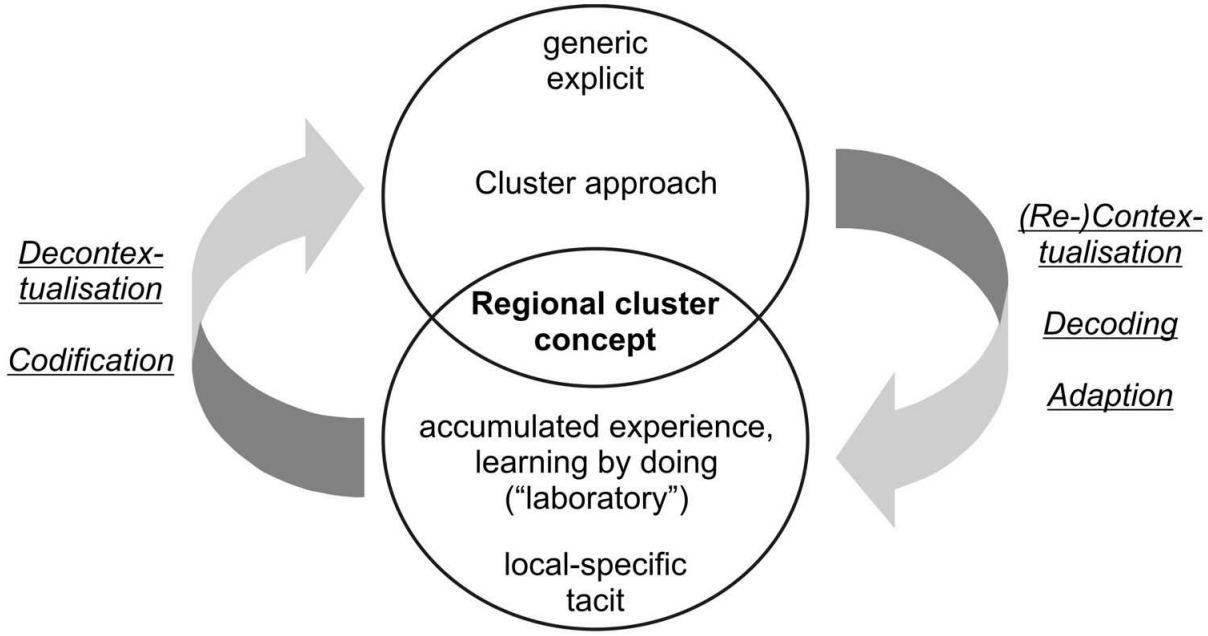
Of the various interrelations between levels of governance, this paper focuses on policy learning in which repeated acts of transfer at the micro level might lead policy concepts such as clusters to diffuse across time and space, or induce hitherto independent policy approaches to economic development to converge towards a common model. The policy transfer literature distinguishes different degrees or intensities, mechanisms, channels as well as determinants of policy transfer (cf. LÜTZ 2007 for an overview). Degrees or intensities range from copying via adaptation and combination to mere inspiration as the weakest form of policy transfer. Mechanisms include hierarchical enforcement, locational competition, negotiation, deliberation and unilateral policy shopping, which resembles voluntary transfer (cf. DOLOWITZ/MARSH 2000) and "lesson drawing" (ROSE 1993). Finally, cluster policies might diffuse via alternative transfer mechanism, such as scientific literature and cluster manuals the mobility of key individuals in politics and administration (change agents, cf. ROGERS 2003: 27), or consultants. Conceptual and operational knowledge on cluster policies may also diffuse within epistemic communities of scholars (cf. HOLZNER/MARX 1979: 107-111) or communities of practice (cf. BROWN/DUGUID 1991), such as The Competitiveness Institute.[5] Another mechanism is policy tourism in which delegations of politicians and practitioners visit alleged best-practice examples of high-tech clustering such as Silicon Valley (cf. HOSPERS/BEUGELSDIJK 2002: 388). All these mechanism might lead to the establishment of formal and informal channels of communication, through which further knowledge on cluster promotion may be exchanged.

Vertical policy learning across different levels of governance may occur *top-down* when the higher level imposes certain strategic thrusts or policy instruments onto the lower level(s), addressed as 'direct coercive transfer' by DOLOWITZ/MARSH (1996: 347). Conversely, it may also work *bottom-up* when experiences gained at the lower levels feed into policy formulation at higher levels. However, the relevance of vertical policy learning can only be assessed in relation to *horizontal* policy learning, i.e. the transfer and adaptation of experiences between entities at the same level of governance, e.g. between regions. To complete the picture, both vertical and horizontal cluster policy learning may be contrasted with cumulative intraregional learning processes. Figure 1 illustrates the interaction of interregional versus path-dependent intraregional learning.

[4] First applied by FUCHS (1994) to the restructuring of the EU's telecommunications sector, the MLG approach has since guided a lot of research on various policies within the EU (see CHRISTIANSEN 1996, and HOOGHE 1996, for some early contributions and BOVAIRD *et al*. 2008, CONZELMANN *et al*. 2008, and KOHLER-KOCH/LARAT 2009, for compilations of more recent work). Introductory overviews are provided by BENZ (2007) and HAGUE/HARROP (2007, ch. 14).

[5] http://www.tci-network.org

Figure 1. Development of Cluster Policies as Interregional Learning



Source: based on HASSINK/LAGENDIJK 2001 and LAGENDIJK 2001

In their knowledge spiral model, NONAKA/TAKEUCHI (1995) suggest that new knowledge exclusively emerges implicitly and context-bound. To apply this knowledge in another context, it needs to be decontextualised and codified through terms, models or theories. Once codified, this knowledge can only be used when recontextualised and adapted to new circumstances, which in turn requires implicit and context-specific knowledge. Based on this model, HASSINK/LAGENDIJK (2001) develop a cyclical model of interregional institutional learning, which LAGENDIJK (2001) applies to the case of mixed land-use in the Netherlands. Applying their model to cluster policy suggests that regional cluster concepts are developed in close interaction between predominantly implicit and contextualised regional knowledge on the one hand, and largely codified conceptual and methodological knowledge on the other. The latter is accumulated through the decontextualisation and codification of experiences from various case studies and thus becomes embodied in scholarly literature, practical guidelines, specialised consultants and their organisations, or in the relations connecting knowledge communities. Applying this stock of knowledge for the development of a new cluster policy requires de-coding and adaptation to a specific context, which is realised through cognitive, social and institutional learning (cf. HASSINK/LAGENDIJK 2001). At the interface between codified and context-specific knowledge, discourse coalitions form between local change agents and non-local transfer agents, referred to as relay agents by LAGENDIJK (2001). However, the exchange of conceptual and operational know-how between the regional and any higher spatial scale is rooted in path-dependent learning processes in which incremental on-the-job learning accumulates a stock of "coagulated experience" (BRÖDNER 2003: 150).

3. Multiple Scales, Federal Variety: Overview of Cluster Policies in Germany

3.1. European Union

In a policy document, the EUROPEAN COMMISSION (2008: 5) summarises its view of clusters: "Europe does not lack clusters, but persistent market fragmentation, weak industry-research linkages and insufficient cooperation within the EU mean that clusters in the EU do

not always have the necessary critical mass and innovation capacity to sustainably face global competition and to be world-class." The cluster approach has substantially gained prominence at the supranational level with the EU's 2000 Lisbon Strategy aiming at becoming the world's most competitive knowledge-based economic area within a decade (cf. ARDY 2011). Clusters came to be seen as an obvious vehicle for promoting innovation, competitiveness and growth to meet this aim. However, the EU's principle of subsidiarity entails a clear division of labour between the supranational and the subordinate (national, regional and local) levels of governance. While cities and regions are deemed responsible for the promotion of clusters on the ground, the European Commission assumes responsibility for cluster mapping,[6] SWOT analyses and comparisons, the identification and dissemination of best practice, the creation of platforms for the exchange of knowledge between cluster policymakers and practitioners, and the linkage of clusters across boundaries (cf. REPPEL 2007: 6). While the Europe INNOVA[7] initiative targets policymakers, PRO INNO Europe[8] caters for the needs of cluster practitioners. Knowledge sharing is promoted by the European Cluster Policy Group established in October 2008 to advise the Commission and member states on cluster development, and the European Cluster Alliance set up as an open platform to maintain a permanent policy dialogue among public agencies charged with cluster policy development and cluster management at the national and regional level.

Further to these direct activities in support of clusters, the indirect impact of the EU's reorientation of its structural funds to support the ailing Lisbon Strategy for the 2007-2013 funding period should not be underestimated (cf. EUROPEAN COMMISSION 2006). Defining 'Regional Competitiveness and Employment' as the new Objective 2 thrust means that the European Regional Development Fund (ERDF) is no longer restricted to supporting lagging regions, but also supports innovation and growth in all other regions for the first time. Although only accounting for one sixth of cohesion policy's total indicative financial allocation of 49.1 billion € for 2007-2013, this strategic shift in funding priorities has direct repercussions on the governance level in charge of the Operational Programmes, which are the federal states in the case of Germany.

3.2. Federal Government

Associated with the co-ordinated nature of its market economy (cf. HALL/SOSKICE 2001), Germany's system of innovation is focused on incremental innovation and diffusion, but has comparative weaknesses in radical and breakthrough innovations, such as biotechnology (cf. CASPER 2007). German policymakers praise the country's research excellence, but lament that German inventions such as the MP3 standard are too often commercialised abroad. Clusters are hence welcomed as vehicles to bridge the perceived gap between science and industry to eventually accelerate innovation. However, a too consequent spatial concentration of public resources is at odds with Germany's traditionally redistributive regional policy, given that spatial equity is a constitutional goal. Unification in 1990 suddenly increased spatial disparities in productivity and innovative capabilities. Technological and socio-economic convergence of the new *Länder* towards the West German level is a special priority of federal government since, and a regionalised innovation policy including the promotion of cluster structures in the new *Länder* is one way of pursuing this aim. National technological competitiveness and the catching-up process of East Germany are thus the twin and potentially conflicting goals of federal government cluster policies.

Germany's federal government embraced the cluster notion in the mid-1990s when trying to promote its fledgling biotechnology industry which was estimated to lag twenty years

[6] The main mapping exercise is the European Cluster Observatory: http://www.clusterobservatory.eu.
[7] http://www.europe-innova.org
[8] http://www.proinno-europe.eu

behind the U.S. and ten years behind the UK at that time (cf. COOKE 2001: 267). The experience of those countries suggested that clusters like San Diego and Boston in the U.S. or Cambridge in England were important sources of those nations' competitiveness in biotech. To close this gap, federal government decided to leverage on the competitive potential of federalism. In 1995, the BioRegio contest was launched to identify and promote Germany's most promising potential biotech clusters (cf. DOHSE 2007). 17 regions entered the contest, and in November 1996, Munich, the Rhineland and the Rhine-Neckar area emerged as winners, with a special vote awarded to Jena in East Germany. The three winners received around 25 million € each over five years, plus privileged access to R&D funding from the federal Biotechnology 2000 programme. The BioRegio contest is now regarded as an important vehicle to jumpstart the biotech industry in Germany which recorded spectacular growth in the second half of the 1990s, although this was helped by legislative changes, a favourable business cycle and ample supply of venture capital at that time.

In the mid-1990s, the initial convergence of the new *Länder* vis-à-vis West Germany had come to a halt, and significant disparities in innovative capabilities and productivity threatened to become persistent. The federal Ministry of Education and Research thus adapted its acclaimed BioRegio model to the specific needs of the new *Länder*: While BioRegio strove for the mobilisation of regional assets for the benefit of national competitiveness, the InnoRegio contest was designed to narrow the gap between the eastern and the western states. In contrast to BioRegio, the new contest was not only confined to the new *Länder*, but also open to all industries and technologies. In 1999, the initial call triggered 444 applications from diverse consortia of individuals and organisations such as businesses, research, education, politics, public administration and associations at the sub-state level (cf. DOHSE 2007: 75 f.). 25 projects were selected by an independent jury, and 23 ultimately qualified for funding. Their relatively equal distribution over the five new *Länder* and Berlin cast some doubts on whether the jury's decision was led by the quality of the applications alone, or if spatial equity considerations or even regional lobbies may have influenced the final choice, especially since it relied on rather 'soft' criteria like originality when comparing proposals across a wide range of disciplines. An evaluation by EICKELPASCH/FRITSCH (2005) revealed that in 87 per cent of InnoRegio projects, most partners had not worked with each other before, and in 55 per cent of projects the actors did not even know most of their partners before their funded project. Convinced by the success of InnoRegio, the federal ministry differentiated the initial concept into a whole new family of programmes called Entrepreneurial Regions (*Unternehmen Region*) to support innovative networks in the new *Länder*.

In September 2006, Germany's federal government announced an interministerial high-tech-strategy (cf. BMBF 2006). Of 14.6 billion € earmarked for 2006-2009, 11.94 billion € were designated for a set of 17 industries and technologies, while the remaining 2.66 billion € were reserved for generic measures of innovation policy. Of the latter, 600 million € were earmarked for measures to join the forces of science and industry, of which the leading-edge cluster competition (*Spitzenclusterwettbewerb*) is the key thrust. The aim was to promote up to 15 already well-developed clusters irrespective of technology or industry in three rounds over a period of five years. Essentially, this means an extension of the BioRegio concept beyond the biotech industry. Consequently, the overall objectives are the same: to identify and strategically promote clusters to achieve leading positions in international competition, to accelerate the commercialisation of new knowledge, to stabilise and create growth and employment, and to make Germany more attractive as a business location.

Following the first call for applications in August 2007, 38 regional projects applied by the closing date in December. A dozen of those projects qualified for the final, before the five winners of the first round were disclosed in September 2008. They qualify for a total funding

of up to 200 million € over a five-year period. Out of the first five winners, two are from the new *Länder*, while one had already been among the BioRegio winners, regional network BioRN. Soon after the first round of selection was completed, the call for the second round was issued in January 2009. Out of 23 applicants, ten finalists were chosen in June and invited to submit detailed applications. Presented in January 2010, all five winners of the second round were from West Germany, four of them having their focus in the two southern states of Bavaria and Baden-Württemberg. In the third and final round, eleven finalists were chosen out of 24 applications, before the five winners were presented in January 2012. In total, the three-round contest triggered 85 applications, of which 15 cluster initiatives were chosen for funding. The number of applications includes a few double entries, as some project consortia applied for a second time after an initial failure. The regional distribution of winners highlights the relative success of regions in the technologically more advanced and yet more prosperous southern Germany. As a result of the underlying strategy to "strengthen the strongest", nine out of 15 *Spitzencluster* are exclusively or at least partly located in Bavaria or Baden-Württemberg. With a BioRegio award and two leading-edge clusters from the first round of the contest, the Rhine-Neckar area emerged as the most successful region in federal government cluster contests early on. North Rhine-Westphalia, Germany's largest federal state with a population of 18 million, attracted only two winners. Three *Spitzencluster* were awarded to Central Germany comprising Saxony, Saxony-Anhalt and Thuringia, while only one winner is located in Northern Germany (cf. BMBF 2012: 5).

Federal innovation policy in Germany has firmly embraced the notion that national competitiveness depends on localised assets. To unleash the hitherto underutilised potential of competitive federalism, the federal government employs contests as a device for discovery and mobilisation, and shows signs of cumulative policy learning when differentiating initial concepts like BioRegio and InnoRegio into entire programme families. However, it may be criticised that the prevailing approach promotes intraregional networks at the expense of interregional and international networking, and that the InnoRegio family to promote innovation networks in the new *Länder* is intrinsically trapped between the conflicting aims of growth and competitiveness on the one hand, and spatial equity on the other.

3.3. State Level

Federal autonomy and competition has led all 16 German states to employ the cluster concept in their economic, regional, and innovation policies, albeit with different degrees of intensity. Table 1 provides an overview and illustrates the variety of approaches, but also highlights some notable commonalities.

Table 1. Cluster Policies at the State Level

State	Policy Initiative (Year of initiation)
West Germany	
Baden-Württemberg	Cluster organisations for IT and media (*Medien- und Filmgesellschaft*, 1995), biotechnology and life sciences (BioPro, 2002), micro technologies (2005) Mapping (cluster atlas) and cluster contest* (2008)
Bavaria	*Offensive Zukunft Bayern* (1994) and *High-Tech-Offensive* (1999), for R&D infrastructure, totalling > 4 billion € *Clusteroffensive Bayern* to establish network platforms for 19 pre-defined state-wide clusters (2006)
Bremen	InnoVision 2010 strategy identifying 7 fields of innovation (2002) Measures to promote science-industry co-operation in 6 areas (*Innovationsschwerpunkte*, 2006)
Hamburg	Cluster management organisations for logistics, aerospace, and media/IT/telecoms
Hesse	Promotion of 5 key technologies

	Regional cluster contest (2008)*
Lower Saxony	State initiatives to promote science-industry networks in 6 key technologies Regional Growth Concepts (2004)
North Rhine-Westphalia	Fields of competence for Ruhr area (*Kompetenzfeldpolitik*, 2000-2005) Contests for 16 pre-defined clusters and open RegioCluster contest*
Rhineland-Palatinate	Some ad-hoc industry initiatives and joint activities with neighbouring states, but no coherent cluster strategy
Saarland	Innovation Strategy 2015 to set up 5 cluster platforms (2001)
Schleswig-Holstein	2004 report listing eight mostly state-wide clusters Economic Development Policy focusing 10 clusters
East Germany (New *Länder* and Berlin)	
Berlin	Innovation Strategy (2005) defines health services as cluster and assigns managements to five further fields of competence
Brandenburg	Cluster-oriented regional policy assigning 16 industry-based fields of competence (*Branchen-Kompetenzfelder*) for priority promotion in selected locations (2005)
Mecklenburg-Western Pomerania	Focus on 9 technology growth poles
Saxony	Policy focus on 4 high-tech industries, but no coherent strategy 6 industry initiatives, starting btw. 1999 and 2008
Saxony-Anhalt	5 innovation networks based on federal InnoRegio contest Cluster study commissioned, but no cluster strategy
Thuringia	Policy focus on 9 key technologies State promotes 8 cluster initiatives, but not coherent strategy

*) direct use of ERDF Objective 2 funding

Source: Own compilation from miscellaneous websites and policy documents.

As at the federal level, the cluster approach has mainly been adopted in technology policy with the aim of bridging the perceived commercialisation gap in areas where the respective states have technological or industrial strengths, or both. However, there is a systematic difference between the old and the new *Länder* since federal government is much more active promoting clusters and networks as part of its particular concern with the lagging East outlined above. As a consequence, the eastern states are generally less active in cluster promotion. Nevertheless, there are also notable differences among the ten western states, especially with regard to the maturity and coherence of their policies, reflecting in part their political orientation and philosophy. For instance, in Baden-Württemberg which has received a fair amount of scholarly attention for its organic cluster structures in automotive and mechanical engineering,[9] the state government traditionally had a liberal and hands-off attitude and refrains from committing significant resources to a broad cluster strategy. Its latest efforts including a modestly-funded regional cluster contest in 2008 were mainly triggered by new ERDF funding opportunities (see 3.1).

It is worth taking a closer look at the two most prominent cases of state-level cluster policies, namely North Rhine-Westphalia (NRW) and Bavaria. Both happen to be the largest and economically most powerful of the 16 federal states, accounting for 21.8 and 15.4 per cent of Germany's population and 22.1 and 17.4 per cent of the country's GDP in 2011, respectively. These figures already indicate that with a per capita income of 13.1 per cent above the national average, Bavaria is more prosperous than NRW which exceeded the national average by a mere 1.4 per cent (cf. STATISTISCHE ÄMTER DER LÄNDER 2012). While

[9] Indeed, it became part of the 'holy trinity' of economic geography together with Silicon Valley and the Third Italy until STABER (1996) found no evidence for the proposed embeddedness of interfirm relations in the social structure of the local milieu, nor their widespread utilisation of local institutional arrangements in support of co-operation and innovation (cf. MASKELL/MALMBERG 2002: 435-437).

Bavaria is characterised by modern high-tech industries and services, NRW still feels the legacy of structural change in its core Ruhr conurbation, and lags behind southern Germany in all major labour market and innovation indicators. In addition, table 1 shows that both states are pioneers of cluster policy at this level of governance. It seems thus intriguing to ask how these differences affect the two states' cluster policies.

Based on experience from its regionalised structural policy developed in the 1980s (cf. DANIELZYK/WOOD 2004), the government of North Rhine-Westphalia started promoting its pilot network programme PROFIS in 1993, which is now seen as the antecedent to its first fully-fledged cluster policy that was to follow after the 2000 state election. This *Kompetenzfeldpolitik* was implemented by gradually focusing ERDF funds for the Ruhr Area onto a dozen fields of competence which were defined in an archetypal political bargaining process (cf. REHFELD 2006). Following a change in government in 2005, the new conservative-liberal coalition publicised an interministerial cluster policy as part of its innovation strategy in March 2007. During the funding period ending 2013, 635 million € of ERDF Objective 2 funding was earmarked for competitive tenders in 16 pre-defined state-wide clusters, an open RegioCluster contest, as well as some cross-sectional competitions (cf. MWME 2006). The state provides degressive funding for 16 state-wide cluster managers which are supported by a central cluster secretariat. Including the third round of funding contests that started in 2010, 52 contests were organised, of which 32 focused on the 16 state-wide clusters. Until the end of 2010, around 400 million € of funding were handed out to applicants for collaborative research and innovation projects (cf. BORNEMANN *et al.* 2010: 195). Analysing the directory of recipients, KAHL (2011: 27 f.) showed that 50.6 per cent of funds went to universities and research institutions, only 26.5 per cent to the business sector, 13.2 per cent to intermediate organisations such as economic development agencies and technology transfer offices, and 9.7 per cent to public administrations. Consequently, the spatial distribution of funding favours regions with strong technological universities, with Aachen attracting the largest share, while regions without such facilities lack the potential to form competitive consortia of applicants. Participants and observers criticise the large number of contests, a lack of transparency and the administrative complexity of the application procedure. As a consequence, SMEs are clearly underrepresented among both applicants and recipients.

The state of Bavaria embarked on a major privatisation effort in 1994, successively divesting 4.15 billion € worth of utility stakes. This revenue was invested in the state's R&D infrastructure through the *Offensive Zukunft Bayern* launched 1994 and the *High-Tech-Offensive (HTO)* started in 1999. While the state is traditionally committed to support its lagging peripheral regions, the main pillar of the HTO accounting for 664 million € was designated to develop and support high-tech centres of world-wide recognition in key technologies. It thus constituted cluster policy par excellence, but without explicit reference to the term. The latter only entered political communication when the HTO expired and privatisation revenues had been depleted. In February 2006, the state government launched its recent cluster initiative as a new stage of its technology policy, endowing it with a comparatively modest 50 million € to establish and fund the management of 19 clusters over a five-year period. These 19 clusters were pre-defined top-down after network-based consultations with industry and university representatives. Each of the 19 cluster management units typically consists of a full-time manager, an unsalaried speaker for representation, and a secretary. Public funding was announced to decrease over five years to put pressure on cluster managements to eventually become self-sustaining (cf. STMWIVT 2006).

In 2008, an interim evaluation commission found that around two thirds of participating firms reported positive impacts of the 19 cluster initiatives on their contacts and co-operations. The report also highlights a few problems, such as the challenge to co-ordinate the

state's top-down initiatives with older cluster initiatives that had emerged bottom-up in various parts of Bavaria (cf. BÜHRER *et al.* 2008). A final evaluation was undertaken in 2010 (cf. KOSCHATZKY *et al.* 2011). As a result of these evaluations, the state government announced to extend its funding for cluster managements beyond 2011 until 2015. Furthermore, the state's cluster portfolio was slightly consolidated from 19 to 16 (cf. BAYERISCHE STAATSKANZLEI 2011). It is worth pointing out the stark difference in governance philosophy when compared with Baden-Württemberg. Both southern states are undisputedly the most advanced German states in technological and economic terms, but the Bavarian government was never hesitant to invest and guide development.

3.4. Cases of Regional Cluster Policy

There is as yet no systematic survey of cluster policies in Germany below the level of the 16 federal states. The most ambitious effort at such an endeavour was a survey of the economic development offices of the 144 largest German cities with more than 50,000 inhabitants. 63 per cent of respondents reported having a coherent strategy to support clusters, networks, or fields of technology or competence (cf. HOLLBACH-GRÖMIG/FLOETING 2008, FLOETING/ZWICKER-SCHWARM 2008). This share clearly increases with city size: While 32.4 per cent regard cluster policy as one of their most important tasks, this share is almost twice as high in cities with more than 500,000 inhabitants, at 71.4 per cent. The objectives pursued by municipal cluster policies are quite diverse, ranging from the networking of firms and other organisations (38.3 per cent) via the retention and attraction of firms (35.1 and 34.0 per cent, respectively) to the protection and creation of employment at 29.8 and 26.6 per cent, respectively. However, these data only cover larger cities, but do not measure regional cluster promotion in larger regional entities and smaller cities.

Though direly needed, a comprehensive mapping of all regional and local cluster policies in Germany is still absent not just for its high costs, 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 134 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.

Since the survey covered the federal and state levels as well, interviews were restricted to the three states of Bavaria, 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, NRW, Bavaria and Lower Saxony were chosen to roughly represent three economically distinct types of region. While structural policy in NRW was for decades dominated by the challenge of promoting 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 but rather falls into the "grey mass" category of regions 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, figure 2 illustrates their varying size stretching from the City of Regensburg, a single municipality with 131,000 inhabitants, to horizontal coalitions of counties and municipalities like the

regions of Hannover, Braunschweig and Nuremberg whose populations range from 1.1 million to 1.7 million inhabitants.

Figure 2. Map of Case Study Regions

Cartography: Stephan Pohl.

Case studies have been selected according to the seven dimensions of cluster policy introduced in section two. In the 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, 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 2008B). 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 assessment.

Table 2. Overview of Regional Case Studies

	Governance	Cluster reference	Cluster orientation	Complexity	Coherence	Institutionalisation	Maturity
Dortmund	public, bottom-up, initiative by large firm, civic foundation	Explicit ("leading industries")	high, but diminishing	high (⇒ urban development)	high	project team ⇒ municipal LED office	2000
"Triangle"	public, bottom-up	explicit ("fields of competence")	high, but diminishing	medium	medium	co-operation of municipal LED units	2001
Wolfsburg	bottom-up PPP (50% VW, 50% City)	explicit	high, but diminishing	high (⇒ urban development)	high	CMO	1999
Hannover	Public, with private sponsoring for projects; counter current	explicit ("focus industries")	medium, but diminishing	high	medium	CMO	2003
Braunschweig	tripartite; counter current	explicit	medium	high	medium	CMO	2005
Nuremberg	tripartite, bottom-up	explicit ("fields of competence")	high	medium	medium	competence initiatives with cluster managers	1994/1998/ 2005
Regensburg	public counter current	explicit	high	medium	low	co-ordination by municipal LED office; strategic partnerships ⇒ associations	1996/2003/ 2006

In *NRW*, the most ambitious cluster approach to local economic development can be found in *Dortmund*, Germany's sixth largest city on the eastern edge of the Ruhr conurbation that had already embraced pro-active structural change 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 the formerly dominant coalmining, steelworks and breweries. As a second sub-state case within NRW, the *kompetenzhoch*[3] 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 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, kompetenzhoch[3] 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).

As the most important case of regional cluster policy in *Bavaria*, the northern district of *Central Franconia* surrounding 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 2005). 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). Contrasting 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 subsidiaries of BMW or Siemens. In boom-town Regensburg, municipal cluster policy emerged in response to federal government contests, starting with the city's BioRegio bid that failed to secure federal funding but eventually led to the establishment of the BioRegio Regensburg 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, when Regensburg emerged as one of the winners of a federal government pilot contest to promote strategic alliances between firms and local governments. In 2006, this approach was transferred locally to the field of IT security (cf. STADT REGENSBURG 2003, DIEFENTHAL 2006, IT-SPEICHER 2008). 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 governments *Cluster-Offensive*.

Unlike NRW 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) were designed to stimulate the bottom-up development of regional cluster policies (cf. KIESE 2008A). The approach was modelled after 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*. Next to cutting local unemployment by half within five years, which was achieved with the help of a cyclical upswing, the local cluster organisation Wolfsburg AG aims at transforming the traditional single-plant location into a self-augmenting mobility cluster in the long run. 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 businesses (cf. STERNBERG *et al.* 2004). As a prototype of its newly-conceived RGCs, the state government teamed up with the city and region of *Hannover* to fund the development of a cluster-based strategy to improve the competitiveness of its capital region by McKinsey & Co. in 2002. In March 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 2008C). In the meantime, the state co-funded the development of a similar McKinsey concept for the *Braunschweig* region, which is pursued by the projekt REGION BRAUNSCHWEIG GMBH since early 2005 (cf. PRÄTORIUS 2004). Since Wolfsburg is one of the eight municipalities that form the Braunschweig region, and VW became increasingly concerned with overlaps and competition between the two cluster initiatives, they promoted the merger of both initiatives into an "alliance for the region" which will took effect in January 2013 (cf. PRBS 2012).

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. Shareholders commit financial resources to the equity and/or the operating costs of a CMO, 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 CMO is jointly owned by Volkswagen (VW) 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.[10]

Table 3. Actors Involved in the Governance of Regional Cluster Policies

	Dortmund	Triangle	Wolfsburg	Hannover	B`schweig	Nuremberg	Regensburg
Counties & municipalities	◉	◉	◉	◉	◉	◉	◉
Large firms			◉	○	◉	○	○
SMEs	○	○		○	◉		○
Chambers & Associations	○	○		○	◉	◉	
Trade unions	○		○	○	◉	◉	
Universities	○			○			○

◉ Core agents, shareholders
○ Other agents, stakeholders

4. Cross-Scalar Interdependencies and Policy Learning

Having characterised cluster policies on four levels of governance, the ultimate aim of this paper is to identify critical linkages between these scales. The MLG perspective demands particular emphasis on vertical learning processes, but these need to be weighed against horizontal and path-dependent intra-regional policy learning for a complete picture.

4.1. Vertical Interdependencies and Learning

The regional cluster policies of Dortmund, Wolfsburg and Central Franconia not only emerged endogenously from within their regions. The Dortmund case served as a case of inspiration for the NRW state government's *Kompetenzfeldpolitik*, together with the Cologne media cluster which the then Prime Minister Wolfgang Clement strongly promoted in his

[10] The local government's preference for high-tech industrialisation is expressed by medical technology, communication and media, while the trade union put energy, environmental technologies, transport and logistics on the agenda –sectors in which it was still well represented. New materials completed the original 1994 portfolio as it was a key target of the Bavarian state government's technology policy at that time (cf. HEIDENREICH 2005: 752).

previous position as a secretary of state responsible for the media (cf. BAUMANN/VOELZKOW 2004, MOSSIG 2004). The two McKinsey-designed cases of Dortmund and Wolfsburg served as a blueprint for the formulation of Lower Saxony's New Structural Policy (NSP) in 2004. Hence, vertical policy learning is not only one-way but may involve critical bottom-up inspiration and transfer at the conception stage. The latter case is particularly interesting since the NSP was only formulated after the state government had co-commissioned McKinsey to work out a cluster strategy and detailed projects for Hannover which led to the establishment of *hannoverimpuls* as a new regional development agency in 2003 (see KIESE 2008C for a detailed account of this case). Having thus used its capital region as a pilot case, the NSP led to the development of three further regional growth concepts including the Braunschweig case which drew on this on-the-job policy learning exercise (cf. KIESE 2008A).

In the other four regional cases, bottom-up initiative was substantially mobilised by top-down incentives from higher levels of governance. The Hannover and Braunschweig cases were triggered by the state government's McKinsey-style NSP. Kompetenzhoch[3] was induced by the city triangle winning the NRW state government's Regionale 2006 contest, while the Regensburg initiatives were induced in a similar fashion by federal government contests including BioRegio.

Since the emergence and expansion of European regional policy from the mid-1970s, Brussels has successively taken over conceptual leadership over its member states and their regions (cf. REHFELD 2005A: 133 f). The Lisbon Strategy and its offspring, the new ERDF Objective 2, directly fed into the agendas of the *Länder* governments since they are the governance level responsible for setting up Operational Programmes. This is most evident in the case of NRW which decided to distribute most of its Objective 2 funding through cluster contests. To participate in such a competition and to qualify for Objective 2 funding, a county or municipality has to develop a cluster concept, which is a strong vehicle spurring the top-down diffusion of cluster policies. At the same time, this triggers an inflation of efforts well beyond the cluster potential that can realistically be developed towards national or even international visibility. Among the first beneficiaries of this policy are professional consultants who readily meet the burgeoning demand for cluster analysis and strategy development. Additional consultancy business was created by the federal government's leading-edge cluster contest since hardly any cluster organisation had the resources and know-how needed to develop a competitive proposal on its own.

Owing to the relative autonomy of the *Länder* in Germany's federal set-up, federal government acts as a facilitator by organising competitions, but does not intervene in state policies, nor is it actively involved in programme management which is left to the federal states or to independent agencies. This explains the government's early resort to contests as a soft instrument setting incentives for states and regions to institutionalise cluster structures and processes. Some state governments subsidises applications from their regions, hoping to raise their high-tech profile by having 'their' candidates among the winners of this prestigious federal competition. It should not be forgotten though that the previous cluster contests, mainly BioRegio and InnoRegio, mobilised sustainable regional cluster initiatives even in many regions that were not among the winners, as illustrated by BioRegio Regensburg. As a consequence, by the mid-2000s there were 25 regional networks and cluster initiatives and five state-level associations in charge of regional biotech promotion (cf. BMBF 2005: 5). Some of them received support from subsequent programmes like BioFuture, BioChance and BioProfile (cf. DOHSE 2007: 77 f.), but it remains questionable if the almost ubiquitous promotion of biotech networks is the most efficient way of growing internationally competitive clusters. Critiques even argue that this rather reflects the country's preference for equity and leads to little more than reintroducing the old-fashioned watering can of regional policy through the back door, an impression that may also be gained from the inflationary

tendencies inherent in many *Länder* cluster policies (cf. REHFELD 2005B: 6). In eastern Germany, InnoRegio triggered a similar mobilisation effect since 40 per cent of the rejected proposals were nevertheless realised by the applicants (cf. EICKELPASCH/FRITSCH 2005). However, it is not known how many of the funded projects would have been carried out irrespective of contest.

4.2. Horizontal Policy Learning: NRW and Bavaria

Frequent references in policy documents and interviews show that the cluster policies of both NRW and Bavaria have been inspired by Upper Austria. The Austrian state made an early decision to invest substantially in cluster promotion and is now regarded as the best practice example within the German-speaking area. In turn, Upper Austria's cluster policy itself was inspired by earlier experiences with automotive cluster promotion in another Austrian state, Styria (cf. STEINER/HARTMANN 1999, TÖDTLING/TRIPPL 2004, FROMHOLD-EISEBITH 2007). However, interviewed practitioners stressed that Austria's smaller size limits the transferability of experiences, as does the volume of funding committed in Upper Austria that German states are neither willing nor able to match, except for Bavaria due to its privatisation thrust which provided a rather unique window of political opportunity. The latter questions the assumption of HOSPERS/BEUGELSDIJK (2002) that the relatively homogenous per capita income of developed economies implies a comparative resource endowment of their cluster policies. Instead, political philosophies, priorities and opportunities seem to play a critical role here.

Further to a common source of inspiration, NRW and Bavaria were also more strongly connected by mutual learning than most other German states. As early as 1997, Bavaria drew on experiences from NRW and other states in the design of its innovation and co-operation initiative for the automotive industry, BAIKA. More recently, NRW's cluster policy was inspired by the establishment of cluster management units in Bavaria, but added the rather innovative element of competitive funding based on own experiences and, more importantly, EU funding requirements. However, policy learning between the two largest German states builds not only on mutual observation, but also on direct interaction that can be traced back at least to 1998 when NRW's former Prime Minister Wolfgang Clement came into office. Despite representing competing parties, Clement and his Bavarian peer Edmund Stoiber agreed on close co-operation and frequent consultations of their leading civil servants, and even held joint cabinet meetings. This partnership included the informal knowledge exchange by ministerial bureaucrats in charge of cluster policy. Despite representing competing parties, the unlikely alliance of political entrepreneurs (cf. FACCHINI 2006) rested on similar biographies and traits, but also on shared political interests vis-à-vis federal government and the EU. At a more general level, informal meetings of bureaucrats and a joint federal-state committee for research and technology provide opportunities for both horizontal learning between states and vertical exchange between federal and state ministries.

In sum, horizontal policy transfer between the states is rather weak and mainly limited to mutual inspiration. The two case studies illustrate, however, that path-dependent institutional learning leaves a much greater imprint on the design and implementation of cluster policies. Large ministerial bureaucracies at the state level act as repositories of experience-based knowledge. This is best evidenced by the breadth and continuity of NRW's cluster portfolio: When a new conservative-liberal state government came into power in 2005, it announced a thorough examination of previous policies and a significant reduction in the number of targeted clusters. After one and a half years of internal discussion and policy formulation, the government came up with a list of 16 clusters in NRW to replace their predecessors' portfolio of twelve fields of competence for the Ruhr area. The interviews revealed that two clusters were artificially split up to divide responsibilities between rivalling ministries. In the end,

NRW's cluster portfolio did not only expand, but also contained all major industries and technologies that were previously supported through the fields of competence policy and various other schemes. This strong continuity illustrates the power of the ministerial bureaucracy. State ministries are not only repositories of knowledge and arenas of incremental learning, but also represent the interests of specific industries, fields of science and technology, and political programmes which tend to develop their own dynamics (cf. OLSON 1965).

In contrast to NRW with its 2005 change in government, Bavaria's ruling conservative party CSU is in power since 1957 without any interruption. Due to this strong political continuity, path-dependent policy learning is even more evident than in NRW. Bavaria's recent cluster initiative builds upon the state's technology programmes *Offensive Zukunft Bayern* and HTO. At the operational level, Bavaria's cluster initiative draws heavily on existing organisations from its earlier technology policy thrust, most notably the state-owned *Bayern Innovativ* society for innovation and technology transfer and its prototype automotive network BAIKA, both established in the mid-1990s. Continuing concerns about spatial equity led to the integration of the regional management instrument from Bavaria's spatial development policy as a path-dependent supplement to its cluster policy.

4.3. Horizontal Policy Learning: Regional Cases

Compared to the state level, the analysis of alternative channels, processes and intensities of cluster policy transfer indicates an overall low degree of transfer to start with. Interregional policy learning is generally restricted to inspiration and some elements of combination. However, there is one notable exception to this general pattern. Influenced by management consultancy McKinsey & Co., the cluster policies of Wolfsburg, Dortmund, Hannover and Braunschweig display higher transfer intensities of copying and adaptation. Among the alternative mechanism of policy transfer, these four cases may be classified as unilateral policy shopping, warranting a more detailed discussion at the end of this section. However, policy transfer was found to be much weaker for the other three sub-sate case studies, with mutual observation embedded in locational competition as the main mechanism.

As far as the channels of policy transfer are concerned, cluster literature appears to play a negligible role among policy-makers and practitioners alike. References to cluster literature are overwhelmingly limited to Porter's definition of a cluster, and manuals dedicated to network and cluster development were largely unknown and did not play a role in the design and implementation of cluster policies. By contrast, the mobility of key personnel appears to be a more relevant channel of policy transfer. Some of the younger cluster organisations surveyed stated that they had consciously hired staff from older cluster organisations, mainly to acquire procedural knowledge, for example on organising start-up contests. At the executive level, a notable case within our sample is a key individual who worked in the city of Cologne's urban development department where he acquired cluster policy experience as managing director of the city's MediaPark. After moving to Nuremberg in 1992, he injected his openness towards the cluster concept into the Nuremberg Programme and thus became one of the founding fathers of Central Franconia's cluster policy. In 1997, this change agent was appointed head of the city of Dortmund's economic development division where he accompanied the development and implementation of the dortmund-project until his retirement in 2004 (cf. KÜPPER 2005, KÜPPER/RÖLLINGHOFF 2005). Through his openness and enthusiasm towards the cluster concept, this change agent thus left a trace of cluster policies linking the different stations of his professional career. Tight budgets notwithstanding, business trips by economic development professionals are quite common during the concept development stage to learn from successful cluster policies first-hand. However, the interviews revealed a general scepticism towards the transferability of cluster

policy experiences made elsewhere and hence towards the potential for interregional policy learning in general.

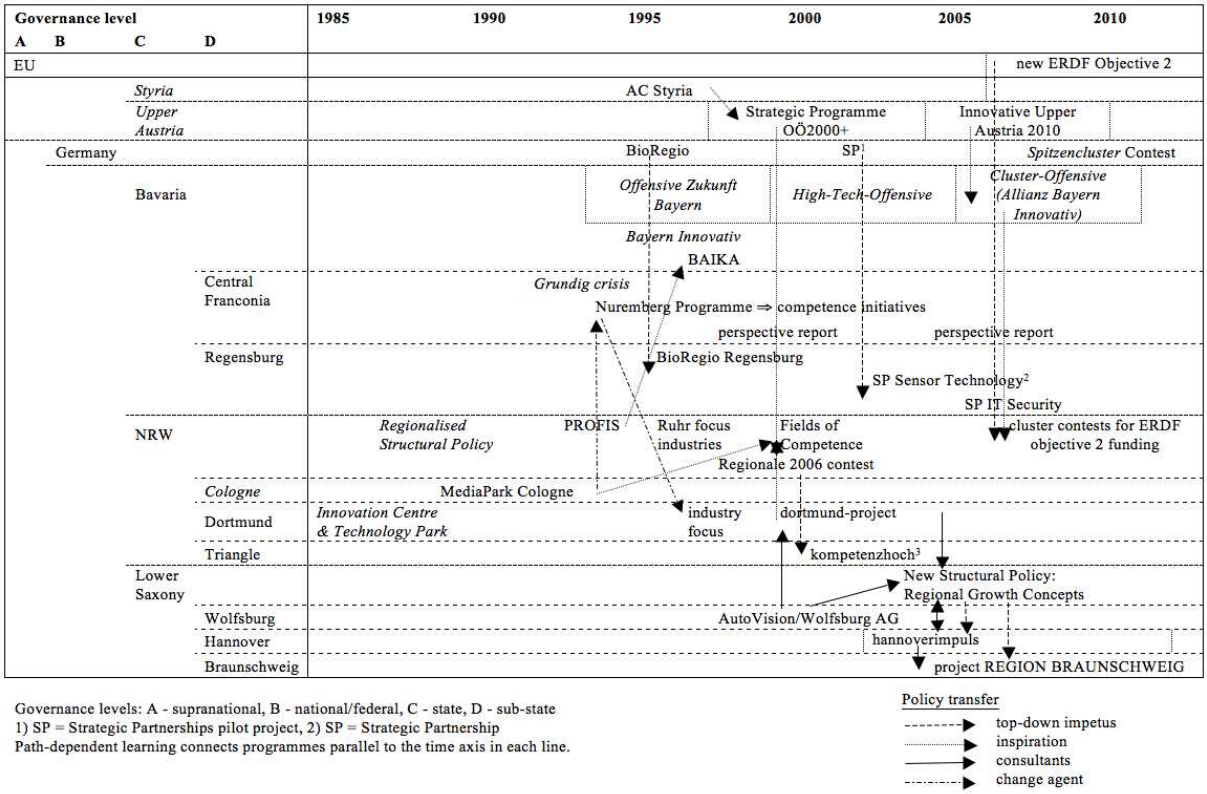
In our sample, the cases of Wolfsburg, Dortmund, Hannover and Braunschweig provide an outstanding example of mainly horizontal policy diffusion via consultants as transfer agents. When international management consultancy McKinsey & Co. was commissioned by VW to develop a concept to revitalise its ailing company town of Wolfsburg in 1998, they could draw on relevant experiences from consulting projects in the U.S. which were decontextualised into the consultancy's knowledge management system. For the development of Wolfsburg's AutoVision concept, this codified knowledge was combined with the accumulated experience of local experts who helped the consultants draft the concept in a joint team over a few months. When the AutoVision concept coincided with a favourable business cycle, McKinsey & Co. went on to sell it as a "plan for German job creation" (HEUSER *et al*. 2001) and as a showcase for the acquisition of similar projects.

When ThyssenKrupp was pressured to compensate the city of Dortmund for the closure of its steel plant, their key customer VW demanded that they set up a manufacturing facility in Wolfsburg (cf. ZIESEMER 2004). This is how the steelmaker became aware of the AutoVision approach which entails the attraction of suppliers to Wolfsburg. In October 1999, Thyssen-Krupp commissioned McKinsey to develop a similar concept in Dortmund to strengthen regional competitiveness through cluster development, which led to the establishment of the dortmund-project in May 2000. When the state ministry for the economy of Lower Saxony became aware of McKinsey's work in Wolfsburg and Dortmund, it developed plans to apply this approach with its capital region of Hannover as a testing ground. When developing the cluster concept for Hannover, the McKinsey-led project team of local experts went to Dortmund for a presentation of the dortmund-project. Some practitioners who were involved in this early stage confirm the consultants' strong inclination to follow their blueprints applied in Wolfsburg and Dortmund (cf. KIESE 2008C).

Following the Hannover pilot case, three further regions of Lower Saxony accepted the offer of state co-funding for concept development, which led to the establishment of new cluster-oriented economic development agencies to pursue RGCs including the Braunschweig case (cf. KIESE 2008A). The latter project purposefully learned from McKinsey's showcase projects in Dortmund and Hannover how to employ and guide the consultants more effectively to accommodate their local interests. Nevertheless, practitioners again report the consultants' strong inclination to apply their blueprints, indicating a systematic struggle between generic and context-specific knowledge. As a common thread to the four regional McKinsey cases, the consultants injected critical conceptual and procedural know-how. However, due to high consultancy fees, their influence was limited to a few months of concept development before the window of intraregional learning closed and path-dependent and experience-based learning gained prevalence once again.

Table 4 summarises our case study evidence of path-dependent cluster policy learning in lines and inter-regional policy transfer indicated by arrows. Inspiration as the lowest possible degree of policy transfer is most common, while initial attempts at copying by consultants were gradually eroded in the process of implementation. Although policy tourism does occur, consultants and the mobility of key individuals are the most effective channels for transfer, but they are rather singular phenomena. As far as mechanisms are concerned, the top-down impetus of policy contests does not fit into the classification proposed by the policy transfer literature which draws on analyses of international policy transfer (cf. LÜTZ 2007). By contrast, policy contests are generally confined to the federal and state level, although they have been tested once at the sub-state level by the Stuttgart region of Baden-Württemberg (cf. SAUTTER 2004). Compared to path-dependent policy learning, however, interregional transfer is relatively sporadic and offers policy and practice ample opportunities for further learning.

Table 4. Policy Transfer and Path-dependent Learning in Cluster Policy: Selected German Case Studies



5. Implications and Outlook

Our contention that cluster policy represents a good case of MLG was well illustrated by Germany, the archetypal federal state in which despite horizontal variety, a distinct division of labour has emerged between the four levels of governance. While the supranational level explicitly restricts itself to cluster mapping, networking and the dissemination of best practice, the EU's reorientation of its structural funds to also support competitiveness and employment outside the lagging regions creates strong incentives for the *Länder* and regions to join the cluster bandwagon, as best evidenced by the NRW case. In the absence of centralised power, federal government started experimenting with the soft instrument of cluster contests in the mid-1990s which it has developed into elaborate families of programmes in the meantime, the most recent *Spitzencluster* contest being the legitimate heir of its initial BioRegio initiative. The sub-national state level shows systematic differences in inter-level relationships in East Germany where federal government assumes special responsibility. Among the old *Länder*, top-down stimuli cause some convergence towards the cluster concept, but marked differences in policy preferences and underlying policy traditions persist. At the scale of sub-state regions, variety is even greater. Mature industrial regions were among the first to apply cluster concepts bottom-up in the 1990s when responding to challenges of severe structural adjustment, thus representing cases of *necessity* cluster policy. To borrow an analogy from entrepreneurship research, the majority of regional cluster policies today grasp the *opportunity* provided by top-down cluster contests which may carry heavy funding weight as in the NRW case.[11]

[11] For an early distinction between push and pull factors in entrepreneurship research, see BIRLEY/WESTHEAD (1994). The Global Entrepreneurship Monitor started juxtaposing necessity and opportunity entrepreneurship in its 2001 report which proposed distinguishing between "entrepreneurship reflecting the voluntary pursuit of opportunity and that reflecting a necessity to engage in entrepreneurship when there is an absence of employment opportunities" (REYNOLDS et. al. 2002: XV). Parallels with cluster policies are thus obvious.

This paper has shown that within a framework of multi-level governance, the direction of learning has changed with the life cycle of the cluster concept in policy and practice. While there have been instances of bottom-up learning in the early stages, this has now given way to a strong current of top-down diffusion emanating from the EU's competitiveness thrust and federal government cluster contests. These contests in particular join top-down impetus and bottom-up initiative in a counter current fashion. Less visible but no less important, demonstration and learning also occurs horizontally between states and regions, the latter mainly aided by a management consultancy in our sample of cases transferring conceptual and procedural know-how from one region to the other. However, interregional policy learning only occurs discontinuously during discrete windows of opportunity. Strategy formulation at the state level and day-to-day policy delivery at the regional level draw to a much greater degree on path-dependent and experience-based learning than on the injection of best-practice know-how from outside.

Policymakers and practitioners may draw some useful conclusions from the variety of cluster policies and the interrelationships between different levels of governance. It appears that the potential for continuous policy learning between regions and across levels of governance is still largely underutilised. The regional and local levels often lack the resources to engage in continuous policy learning, let alone concept development. This is an issue that the supranational and federal level might address more thoroughly. Similarly, the mobilising, awareness-raising, and learning effects of cluster contests call for further applications of this Hayekian discovery device to different institutional contexts (cf. VON HAYEK 1978: 179-190). However, politicians and practitioners should be aware that implementation is increasingly complicated by complex vertical and horizontal constellations of actors in the congested state. This complexity is further exacerbated by the variety of industrial structures and institutional environments across regions that limit the usefulness of best practices and policy blueprints considerably (cf. HOSPERS 2005, 2006). Successful cluster policy thus does not only depend on a region's economic and technological cluster potential, but also on the institutional or organising capacity needed to meet the ensuing challenges of governance (cf. BURFITT/MACNEILL 2008). Further to these demands, to a number of critics successful clusters stimulating economic development are the exception rather the rule. Policies in support of clusters are thus well-suited if there is credible potential for national if not international competitiveness and sufficient institutional capacity for its development. If these conditions are not met, clusters should not be used as model but rather as an analytical tool for economic development to identify and address regional bottlenecks to innovation and growth. Drawing on FESER (2008), this means a shift from the conventional to an intelligent approach to cluster policy that acknowledges clusters not as an end in itself, but rather as a means of identifying and tackling obstacles to lift regional innovation, growth and employment onto a higher level.

This paper explored the interrelationships between different levels of governance from a policy learning perspective. More detailed case studies are needed focusing on vertical and horizontal co-ordination, as well as their interrelation and distributions of power. Complexity further multiplies when MLG and intra-level relations are combined with alliance building and maintenance within a region. Further exploring the congested state empirically calls for an in-depth single case study approach. However, to overcome a major deficiency of previous research, case studies should also be designed as comparative endeavours using a common methodological approach to allow for some degree of generalisation, abstraction and modelling at a later stage. As already demanded in the introduction, the complexity of its object calls for cluster policy research to adopt an interdisciplinary approach. Clusters frequently extend beyond administrative boundaries or statistical industry classifications, and neither can one single academic discipline accommodate the manifold facets of the issue.

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