Cluster policy in an evolutionary world? Rationales, instruments and policy learning.

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2 Cluster policy in an evolutionary world? Rationales, instruments and policy learning

Elvira Uyarra and Ronnie Ramlogan

2.1 INTRODUCTION

Scholarly and policy interest in regional clusters has grown unabated over the past two decades. The work of scholars to investigate the nature and influence of clusters on innovation performance and regional economic prosperity has developed alongside a significant expansion of cluster-inspired policies, motivated by the lure of high-profile clusters such as Silicon Valley.[1]

Despite the popularity of the concept and its widespread use in policy, surprisingly little is understood regarding the nature of these interventions and their impact. As Nauwelaers and Wintjes (2008: 253) note, there is a significant gap between the diffusion of the cluster 'model' and 'the uncertain progress made with regard to learning in cluster policy-making' (see also Ketels 2013). A clear indication of this gap is a shortage of analysis evaluating such policies (Sölvell et al. 2003; Andersson et al. 2004; OECD 2007; Technopolis 2011).[2] The benefits of clusters referred to in the literature relate to studies that examine the effects of clustering when it occurs 'naturally', rather than constituting a direct assessment of cluster initiatives (Duranton 2011).

The contrast between the extent of cluster policies and the lack of evidence about cluster policy effectiveness has become a conundrum for scholars and practitioners at a time of renewed pressure for evidence about 'what policies work, where'. We argue, in line with Aranguren et al. (2016) that, paradoxically, increasing demands for evaluation and evidence-based policy are being made at a time when increased policy complexity is challenging these very efforts towards policy learning. Cluster policy is an extreme example of this, given the lack of clear rationales, and the multi-dimensional and multi-instrument nature of the intervention. This chapter aims to shed some light into this policy complexity.

We can differentiate the extensive literature on clusters according to their take on policy and their static or dynamic views on clusters. First, and mainly within economic geography and sociology, scholars have contributed with theoretical but also empirically informed literature to our understanding of the characteristics of clusters and their influence on firms' performance (Saxenian 1994; Malmberg and Power 2005; Baptista and Swann 1998). This literature has tended to see clusters as essentially organic and firm-led, implicitly or explicitly suggesting that public policy plays a very small part in cluster development. It has either shied away from providing policy discussions or explicitly questioned the economic rationale of policy intervention for cluster support (Duranton et al. 2010). By contrast, a vast and rapidly expanding policy related literature (Andersson et al. 2004; Sölvell et al. 2003; Ketels et al. 2006) has emerged in the past decade, which is much more sympathetic towards cluster support intervention but somehow blind to the risks and challenges of policy implementation.

Another point of differentiation is between static and dynamic views. While conventional cluster models tend to see clusters as static entities, recent contributions have added a dynamic perspective, incorporating ideas from evolutionary economics and complex systems in order to understand how clusters emerge and transform regional economies, and suggesting specific stages in the emergence, growth and decline of clusters (Menzel and Fornahl 2010; Martin and Sunley 2011; Fornahl et al. 2015).

We argue, however, that there is a missing element in the literature that addresses not just the life cycle of clusters but also the dynamic nature of policy, including the more 'messy' aspects to do with policymaking. This chapter therefore seeks to contribute to the ongoing debate of cluster policy by considering the evolving rationales for cluster policy and the difficulties of policy implementation. We address this issue by offering a reflection about the nature of policy intervention in the context of an evolutionary or life cycle approach to clusters. The structure is as follows: we first review the debates around the definition, impacts and evolution of clusters. We then consider the relationship between clusters and policy before reviewing the diversity of cluster policy intervention and the challenges for implementation and policy evaluation.

2.2   WHAT ARE CLUSTERS? SITUATING THE DEBATE

Clusters, popularized by Porter (1998: 197) as 'geographical concentrations of interconnected companies and institutions in a particular field', have

been studied from very different theoretical perspectives and approaches (Benneworth and Henry 2004; Gordon and McCann 2000; Rehfeld and Terstriep 2012). Gordon and McCann (2000) proposed a threefold characterization of clusters: (1) a 'pure agglomerations' model based on localization externalities, (2) a 'social network model' emphasizing exchange of information and collective learning, and (3) an 'industrial complex model' around the formation of local production systems. In practice, however, most approaches are a mixture of the three models (Gordon and McCann, 2000).

Most explanations of clusters, particularly those pertaining to pure agglomeration models (Gordon and McCann 2000), refer to the three key sources of localization externalities suggested by Marshall. Since Marshall's (1890) analysis, the advantages arising from geographical proximity have been associated with external economies in the form of specialized labour markets, input suppliers and knowledge spillovers, giving rise to innovation and productivity benefits. Co-location is associated with better access to specialized, high-productivity employees with lower search and training costs. At the supply input level, intermediate industries provide downstream firms with local access to specialized materials and components, finance, marketing and business services, as they themselves exploit greater internal economies of scale and benefit from reduced transport costs. In addition, technological externalities arise through shared technological information and knowledge spillovers. The importance of knowledge spillovers is, however, often overestimated. As Orsenigo (2006) argues, a lot of knowledge does not 'just spill over'. Its influence tends instead to be largely indirect and it is therefore quite difficult to clearly separate knowledge spillovers for other types of pecuniary externalities such as mobility of researchers and workforce, urbanization externalities or even natural endowments.

More aligned with the idea of clusters as networks, scholars have highlighted the advantages of certain forms of cluster structures for the performance of clusters. For instance, Saxenian (1994) argued that the superior performance of Silicon Valley was explained by its configuration as a regional, network-based industrial system founded upon dense social networks and an open labour market, which encourages entrepreneurship and competition as well as learning through informal communications.

Despite the extensive literature on the topic, the economic effects (and associated costs) of clusters are still unclear. For instance Baptista and Swann (1998) and Baptista (2000) found that firms in clusters tend to be more innovative than non-clustered firms, while Aharonson et al. (2008) found that the ability of firms to benefit from clusters was not uniform, with 'uninventive' firms with more limited internal and external resources

being less likely to benefit compared with their inventive counterparts. Frenken et al. (2015) reviewed the literature dealing with how localization economies affect entry, exit and growth in industry. They found strong evidence of clustering effects on entry (although that does not necessarily indicate an effect of localization economies, as company founders may already be present in the region), weak evidence on firm performance and some evidence of positive impact of co-location of firms active in related industries.

As Swann (2006) reminds us, clusters are not unambiguously a 'good thing' and firms face both advantages and disadvantages from locating in a cluster. Disadvantages are related to overspecialization leading to long-term lock-in, inability to adapt and therefore greater vulnerability vis-à-vis external shocks (Grabher 1993). Clustering has also been associated with negative effects from congestion and competition both in input and output markets (Swann et al. 1998), leading to raising costs of real estate and specialized labour.

While it is widely accepted that clustering of industries and firms is a 'fundamental fact of economic life' (Dicken 2007: 62), there is little consensus on whether there is a case for policy intervention. A number of commentators have questioned the economic rationale for cluster policy (Brakman and van Marrewijk 2013). For instance, Duranton (2011) argues that Porter's model of competitiveness is not a good guide to policy. It leaves open questions such as: which rationales and which policies are associated with each part of the diamond? What government level is best suited or has sufficient competences to deal with these policy issues? How can all the four parts of the diamond be improved? How can negative feedbacks or tensions across policies be dealt with? He thus concludes that 'even if the public authority that oversees the cluster is highly competent and attempts to maximise local welfare, an optimal cluster policy looks like something extraordinary difficult to achieve' (Duranton 2011: 25).

Besides complex implementation issues, others have argued that cluster policy may in certain instances do more harm than good (Brakman and Marrewijk 2013) by unintentionally leading to regional economic and institutional or policy lock-in, diminishing the regional potential to adapt to new economic circumstances. Duranton et al. (2010) analysed the French Local Productive Systems policy and concluded that the benefits of cluster policies are modest, particularly when the costs are factored in, including the potential negative effects such as policy capture of corporate interests and greater vulnerability to external shocks as a result of increased specialization. Swann (2006) further suggests that policy intervention to strengthen strong clusters may do so at the direct cost of other weaker clusters and/or areas.

2.3 PUBLIC POLICY AND CLUSTER DEVELOPMENT

Despite the reservations mentioned earlier regarding the rationales and costs of supporting clusters, cluster policy has in recent years become 'almost axiomatic to most local and regional economic development strategies' (Palazuelos 2005: 131). The reasons for this are many. The appeal of Porter's model lies in its relative simplicity but also in its ability to bring focus and direction to regional policy (Brakman and Marrewijk 2013). The emergence of the cluster concept proved an attractive proposition to policymakers, particularly at a time when traditional regional and industrial policies had fallen into disrepute, viewed as either ineffective or associated with supporting national champions (Duranton et al. 2010). In this context, clusters provided a method of achieving a number of broader policy goals such as improving competitiveness and innovation, and supporting regional development (Nauwelaers and Wintjes 2003).

The diffusion of the cluster model has been pushed along on many fronts. It has been supported by an extensive and rapidly expanding literature describing best-practice cases that make cluster development processes appear 'more straightforward than they really are' (Asheim et al. 2006: 22). Also the work of consultants and transnational organizations such as the OECD and the European Commission, the development of communities of practice and the flows of 'policy tourism' (Castells and Hall 1994; Hospers and Beugelsdijk 2002; Kiese 2010; Rehfeld and Terstriep 2012) have been key transfer mechanisms. Transnational organizations and other communities of practice have greatly contributed to the institutionalization of the field (for instance, through conferences like the TCI and other fora such as the European Cluster observatory as well as training and qualification programs) (Rehfeld and Terstriep 2012).

Rehfeld and Terstriep (2012) argue that while contemporary trends in the global economy and political systems such as processes of regionalization and policy decentralization have contributed to the anchoring of the cluster idea in the political field, framing and institutionalization processes have played a stronger role in the adoption of the cluster approach. Institutionalization has in turn created a strong bias towards success stories, with a tendency to overstate the capacity of regional players to act on the right policy levers that cluster development requires and overlook implementation challenges and potential risks of policy intervention (Rehfeld and Terstriep 2012; Duranton 2011; Uyarra and Flanagan 2010; Palazuelos 2005; Hospers et al. 2008).

Despite Porter's (1998: 89) claim that governments should 'reinforce and build on existing and emerging clusters rather than attempt to create

entirely new ones', building (or 'activating') cluster support remains the dominant rationale for policy (Feser et al. 2008). Implicit views that clusters can be 'made' contrasts sharply with empirical evidence of cluster genesis and evolution, with a subsequent tendency to confuse cases of spontaneous or organic cluster emergence with organized efforts to stimulate and manage clusters (Kiese and Wrobel 2011; Kiese and Hundt 2014).

These arguments also resonate with other warnings against following a 'one-size-fits-all' cluster model. Despite acknowledging that not all clusters are alike, Porter's theory has been associated with a 'one-size-fits-all' or 'cookie cutter' policy formula regardless of contexts and capacities of local actors (Asheim et al. 2006; Burfitt and Macneill 2008; Ebbekink and Lagendijk 2013; Wolfe and Gertler 2004). Indeed, despite frequent exhortations about the need for adapted and context-sensitive policies, the mimetic adoption of recipes that seem to have worked elsewhere remains all too common.

What then is the role of public policy for clusters? As Carlsson (2006: 272) reminds us, 'policy making in a complex, nondeterministic world is an extremely difficult art: How do you make policies then the desirable outcome lies decades down the road and cannot be specified?' While public sector decisions invariably affect cluster development, their influence is often indirect, driven by policies such as infrastructure, research, education and training rather than policies directed at clusters per se. While public policy has been found to play an important role (see, for instance, the clusters studies in Braunerhjelm and Feldman 2006 and van der Linde 2003), this influence is often indirect and inadvertent (promoting the cluster was not the primary target of the policy). There are, however, reported examples of successful policy-led clusters, such as the development of the biotechnology cluster in the North Carolina Research Triangle (Link and Scott 2003). Avnimelech (2013) discusses this case in contrast with Israel's failed policy attempts to support the sector, which he attributes to a lack of clear vision, funding and resources, and insufficient coordination between the different government agents.

While arguing that clusters may not be the 'magic bullet' they have assumed to be in some circles, some views indeed maintain that the cluster approach does have something to offer to policymakers (Burfitt and Macneill 2008). Benneworth and Henry (2004), for instance, suggest that the value added of clusters lies in their ability to enable dialogue between the academic and policy literature. Feser (2008) argues that, rather than directly supporting clusters, the cluster concept should be used as a means to leverage innovative synergies among business to improve the implementation of innovation policy, regardless of whether a discrete spatial cluster emerges as a result (see also Ebbekink and Lagendijk 2013). Borrás and

Tsagdis (2008) make a similar distinction between a narrow approach of direct cluster intervention by public authorities at one level of governance (cluster policy) and a broad approach that reflects the systemic, multi-actor and multilevel nature of cluster policy and the broader set of activities influencing clusters (policies for cluster).

2.4 CLUSTER DYNAMICS, CLUSTER LIFE CYCLE AND IMPLICATIONS FOR POLICY

A frequent critique to conventional cluster models is that they depict clusters as static rather than dynamic entities (Boschma and Kloosterman 2006). Martin and Sunley (2011) note how Porter himself lacked a coherent theory of cluster evolution. The main literature has taken the development of clusters almost as a given, focusing instead on identifying the ingredients or factors perceived to be present in successful industrial clusters, *inter alia* the presence of a scientific base, the favourable institutional support, a culture of entrepreneurship, and active venture capital (Bresnahan et al. 2001). Such lists of attributes or ingredients tell us little however about how clusters 'emerge, take hold and transform regional economies' (Feldman et al. 2005: 130).

The determinants, benefits and network dynamics of clusters tend to change over time and such issues are beginning to take hold in the literature. The idea of the cluster life cycle has received considerable interest in the past few years, with academic studies describing a series of cluster stages following an evolutionary logic. A number of approaches have suggested that, besides industry-driven cycles,[3] there is a cluster specific process that drives evolution independently of the particular industry life cycle (Iammarino and McCann 2006; Menzel and Fornahl 2010; Pouder and St John 1996; Fornahl et al. 2015).

Drawing from the organizational ecology tradition, Pouder and St John (1996) argued that clusters decline as a result of an increasing cognitive isomorphism of companies of the clusters, leading to lock-in. For Menzel and Fornahl (2010), the heterogeneity of knowledge also constitutes the foundation of cluster development, and as the cluster moves through the life cycle heterogeneity increases or decreases.

Martin and Sunley (2011) note, however, that the life cycle notion has a problematic deterministic flavour insofar as it assumes that industries or clusters 'naturally' evolve from one stage to the next in some sort of inevitable 'ageing' process of clusters (although approaches such as Menzel and Fornahl's (2010) conceive the possibility of clusters moving back into a growing phase if heterogeneity levels increase). Frenken et al. (2015: 15)

add that, rather than treating cluster life cycles stages 'as predetermined successions', the concept should be best understood 'as a heuristic device to organize empirical cases into a coherent framework without denying the indeterminate outcome of processes'.

Trippl et al. (2015) argue that the cluster life cycle approaches have other limitations. In particular a neglect of the multi-scalarity of cluster evolution, namely how the interaction of multiple factors (such as knowledge sourcing and institutional frameworks) at various spatial scales shape cluster development paths, and a tendency to focus on the structural dimensions of clusters at the expense of agents and their activities. Such a critique reflects a more general critique of contemporary regional analysis, in which 'actors have been displaced by processes' (Markusen 2003). One notable exception is Feldman et al.'s (2005) account of entrepreneurs as key 'change agents' driving cluster formation and evolution. Drawing from ideas of complex adaptive systems and an empirical case of the biotech and the ICT clusters around Washington DC in the US, they articulate a three-phase model (emergence, self-organization and maturation) of cluster development as a product of exogenous shocks igniting innovation as well as human agency, adaptation and evolution. Unlike previous approaches, entrepreneurs are placed at the centre of cluster emergence, their actions considered 'catalytic components of a self-organizing system' (Feldman et al. 2005: 133), that co-evolve with organizations and institutions supporting it.

2.5   POLICY IMPLICATIONS OF CLUSTER LIFE CYCLE VIEWS

Finally, although the importance of institutions, including public policy, are acknowledged in cluster life cycle approaches, their role is relatively overlooked in relation to how they may shape the formation and performance of clusters and networks over time (Ter Wal and Boschma 2011). There is actually very little literature that looks at how policy shapes clusters over time.

A number of contributions have incorporated a more dynamic view of policy interventions however. For instance, informed by industry/technology life cycles, the evolutionary targeting policy approach (Avnimelech and Teubal 2008; Rosiello et al. 2011; Rosiello and Mastroeni 2013) suggests a policy intervention that allows for the introduction of adjustments according to policy and market-oriented learning. These authors argue that policy goals and means should change along this life cycle. For instance, policies should aim at shaping framework conditions

and promoting variety during the background phase, promote successful experimentation in the pre-emergence phase and leverage successful trajectories in the emergence phase.

More specifically referring to cluster life cycles, Brenner and Schlump (2011) similarly discuss the sequencing of interventions according to the needs of the different stages of the cluster life cycle. They argue that different sets of measures would be relevant at different stages of cluster life cycle; for instance, start-up promotion would be particularly relevant in early stages, while mature stages will benefit more from human capital development and cluster renewal.

Other views on cluster policy are more centred on network evolution and network renewal in relation to cluster life cycles. As clusters evolve, networks become more stable and homogenous (through increased homophily and assortativity), thus increasing their risk of cognitive and technological lock-in (Ter Wal and Boschma 2011). In order to improve cluster resilience, Crespo et al. (2014) argue that policy interventions should be more 'surgical' and adapted to network evolution. Such intervention, they argue, should not be invariably focused on network density, but instead bridge connections between the core and periphery of nodes to allow for new and disruptive ideas (see also Vicente, Chapter 3, this volume).

Other approaches advocate interventions to promote related variety (diversification into related activities) as a means to avoid overspecialization and regional lock-in, for instance via platform policies, structured on the basis of shared and complementary knowledge bases and competences, labour mobility and the promotion of extra-regional links (Cooke 2012; Asheim et al. 2007). This approach entails a different form of targeting and selectivity from the evolutionary targeting policy approach, as it is not about supporting activities identified as promising for economic growth, but about identifying new 'recombinations' to improve regional diversification and resilience.

Overall, and unlike the critical, more laissez-faire views of traditional cluster literature, these evolutionary approaches recognize a role for public policy supporting clusters. They advocate a more nuanced and 'surgical' approach to cluster support compared to heroic views of cluster policy intervention. Policies need to be adapted to the cluster life cycle and aim at leveraging synergies rather than create clusters; they should be a sort of surgical rather than a one-size-fits-all form of intervention linked to structural characteristics and the evolution of clusters.

Nevertheless, consideration of policy still tends to be confined to the normative question of policy implications. Policy is rarely seen in the literature as embedded in and shaping cluster transformation. Further, while the focus is on how to best support cluster development, discussions stop

short of addressing actual policymaking, including the translation of academic insights into the implementation of policies, as well as issues to do with policy learning and the influence of politics.

For instance, as noted by Ebbekink and Lagendijk (2013), indirect or leveraging approaches to cluster support are confronted with significant difficulties for implementation within normal institutional and administrative processes as described. Decisions taken by policy implementers may lead to significant variations in the same policy instrument across time and space, regardless of the policy rationale and strategy (Flanagan and Uyarra 2016). Yet little attention is paid to the influence of the actors involved in implementing cluster policies and strategies.

2.6   CLUSTER POLICY: INSTRUMENTS AND IMPLEMENTATION

But what are cluster policies? Cluster policies have been defined as comprising all 'efforts of government to develop and support clusters (in a particular region)' (Hospers and Beugelsdijk 2002: 382). However, whether we can really speak about cluster policy or about a refashioning of existing sectoral policies has been called into question (Benneworth et al. 2003; Raines 2002).

Understanding cluster policies is difficult as they diverge broadly in terms of their objectives and rationales, the institutional configuration, the level of government involved, and the nature of government intervention (Enright 2003). So-called 'cluster policies' are characterized by extensive variation, although they have in common a particular institutional framing and language used to 'develop, describe and, very often, market these policies' (Benneworth et al. 2003).

As Laranja et al. (2008: 825) note, 'the specific policy rationales, whether implicit or explicit, are the starting point for any evaluation of the effectiveness of policy action'. However, cluster policy interventions rarely specify the concrete failure that the intervention is meant to address (Duranton 2011). Most of the evaluated cluster programmes reviewed by the authors for the Nesta Compendium study[4] (Uyarra and Ramlogan 2016) lacked a clear policy rationale, or were limited to some vague references to Porter's model or to systems of innovation theories. The precise objectives and the criteria to evaluate the programmes were often defined *ex post*.

But policy interventions are not a one-to-one application of academic theories. They are shaped not just by scholarly ideas but also by other rationales informed by political, institutional and ideological preferences that influence the way in which specific ideas are taken up and translated

into specific policy rationales (Laranja et al. 2008). Which policy area is embraced first and more strongly and other institutional path-dependencies often explain the diversity in the dominant adopted rationales and the interpretation and application of the cluster concept in different countries and regions (Sternberg et al. 2010). For instance, while in Germany cluster policy is rooted in regional development policy, in Finland the origin of cluster policy can be placed in the context of Finnish technology and innovation policy. The Dutch 'Peaks in the Delta', model as well as the French cluster approach, exhibits a combination of spatial policy, regional development and technology policy (Rehfeld and Terstriep 2012).

The rationales behind interventions also change over time. Sotarauta (2012) describes the evolving meta-rationales inspiring innovation policy intervention in Finland and how the changing policy discourse shaped the way the cluster concept was used, evolving from a Porter-oriented industrial cluster approach to a broader and more loosely understood cluster-oriented policy. He identifies a mismatch, however, between the broader aspirations of newer approaches and the actual reforms, confirming Laranja et al.'s (2008) argument that policy rationales are not necessarily directly substituted for each other but accumulate over time.

Cluster policy intervention can also vary in terms of the types of sectors, firms, and territories targeted and the identification and selection of the targeted clusters. Much has been debated in relation to cluster identification and targeting, differentiating, for instance, between top-down and bottom-up selections of clusters. Difficulties in cluster identification are associated with a lack of reliable data, since clusters rarely conform to sectors and as a result, significant clusters may be obscured or unrecognized (Hospers et al. 2008: 288). On the other hand, too broadly or vaguely defined clusters may respond to politically driven policy agendas (Henry and Pinch 2006). For instance Burfitt et al. (2007) describe how, in order to avoid conflict among key regional players, cluster managers in the West Midlands failed to create a workable definition of the medical technology cluster.

The designation of particular clusters as policy targets tend to be a highly politicized process not necessarily done because it makes economic sense but because of their appeal to certain political constituencies (Burfitt and Macneill 2008). Policymakers may find themselves under pressure to identify as many clusters in as many areas as possible for fear of upsetting potential voters (Hospers et al. 2008) or 'captured' by local producers, particularly in declining industries (Duranton et al. 2010). Many cluster programmes (such as the French Pôles de compétitivité programme or the Basque cluster programme) initially selected a reduced number of key industries for support, only to later on extend the selection to other

industries or less advanced regions. Local policymakers may also be
tempted to focus on new and politically more 'visible' projects rather than
the development of their own productive capabilities (Duranton 2011).

A further dimension in which cluster policy exhibits diversity relates
to the nature of policy measures. Policies under the 'cluster' banner or
informed by the cluster approach use a variety of instruments, in fact they
are a form of 'umbrella policy' that can include any of the instruments of
traditional economic policies (technology, industrial, regional). So typi-
cally it would include a combination of instruments such as R&D funding,
setting up of intermediaries, venture capital funds, competence centres,
support for training activities, networking and identity-building.

This implies that cluster policies are implemented in the context of
pre-existing policy mixes, which would condition their effectiveness.
However, and somewhat paradoxically, cluster policy evaluations rarely
question the rationale of the programme vis-à-vis other national or
regional policies, namely the programme relevance in relation to the
broader innovation support environment of the country or region. Nor
do they often consider issues such as cluster selection, periodicity and
adaption of policy tools to the life cycle of clusters. Although one excep-
tion is the evaluation of the Norwegian centres of excellence (NCE)
programme, which recommended a better coordination with the broader
'policy mix', so that collaborative R&D and innovation projects with
long-term potential can be funded outside of the NCE programme, and
a more adapted and coordinated assistance along the life cycle of the
clusters (Uyarra and Ramlogan 2016).

Policy instruments display a degree of interpretive flexibility and thus
vary according to context and implementation of an instrument (Flanagan
et al. 2011). More important than the choice of instruments is, therefore,
how they are implemented, the actor constellation in terms of the mix
of public/private sectors and the type of support institutions available.
Decisions taken by actors implementing policies will therefore lead to
significant variations of similar instruments across time and space. Policies
implemented at one level of government (for instance, national cluster
policies) may elicit different (positive or null) responses at lower levels
(Lanahan and Feldman 2015).

The responsibility for the management of clusters generally lies with
separate organizations whose roles may vary considerably, including the
implementation of cluster policies, coordination of activities and provi-
sion of support services to cluster members. Okamuro and Nishimura
(2015) investigate the local management of national cluster policies and
the associated effects on performance. In a comparison between German,
Japanese and French clusters, they find that differences are a product of

the interplay between basic conditions, the type of national cluster policy, and the type of local cluster management.

Some literature has pointed to the crucial role that certain individuals, so-called 'cluster entrepreneurs' or 'civic entrepreneurs', play in cluster development. For instance, Ebbekink and Lagendijk (2013) discuss the role of 'civic entrepreneurs' as knowledgeable and reputable actors with good communication skills able to motivate, empower and enthuse stakeholders. Ingstrup and Damgaard (2013) explore the key role of cluster facilitators, their mix of competences (networking, communication, marketing) and their relevance at different stages of the cluster life cycle. These are highly specialized roles that include types of competencies beyond those required for project management. Not only do facilitators have to interact and communicate effectively, they have to create and generate enthusiasm among the different enterprises and knowledge actors in order to sustain involvement and ensure the credibility of the cluster.

Given this policy complexity, understanding the effectiveness of cluster policy is a difficult task (Diez 2002; Raines 2002; Fromhold-Eisebith and Eisebith 2008; Aranguren et al. 2014). The effect of a cluster policy may also not be observable for a considerable period of time. Even though effects are likely to materialize only in the long term, often not enough time is lapsed between the implementation of the policy and the evaluation. The long-term nature of cluster development often stands in sharp contrast with the relative short time horizon of politically based electoral cycles (Rehfeld and Terstriep 2012).

Political or corporate interests that often dominate cluster schemes can also act as institutional impediments to the evaluation of results (Fromhold-Eisebith and Eisebith 2008). Evaluations are more often than not commissioned reports guided by politics and administration (Sternberg et al. 2010), used for 'internal' purposes (for instance, to justify follow-on funding) and often not made public. For instance, Ahedo (2004) reports how the government of the Basque Country in Spain commissioned an evaluation of its cluster policy in the late 1990s, but used it only internally rather than to stimulate an institutional debate, thus limiting its policy learning potential.

The motivation of the evaluation notwithstanding, establishing the additionality of the intervention and attributing the different modes of intervention to impacts is a complex challenge. It is difficult to disentangle the effects of the policy from the natural evolution of clusters and isolate cluster policy from the effects on clusters of other policies at different domains and/or levels (Magro and Wilson 2013). The multi-instrument nature of the policy makes the identification of causal relations a difficult task, as the different policy instruments may interact or even conflict with

each other. Causality may even be reversed, since cluster programmes may attract enterprises that already have potential for growth (Uyarra and Ramlogan 2016). The lack of a robust control group makes the interpretation of these findings difficult in terms of additionality and attribution.

Given these challenges, Schmiedeberg (2010: 404) recommends that 'using only a single evaluation method will provide a very limited view on the cluster policy programme'. However, in practice, cluster policy evaluations adopt a very narrow range of assessment methods (Technopolis 2011; Uyarra and Ramlogan 2016), generally ill-suited to capture the complex interactions that take place within policy systems (Magro and Wilson 2013). Cluster policy evaluations generally rely on descriptive statistics derived from (self-reported) survey and monitoring data and, occasionally (although increasingly), econometric analysis to estimate impacts on employment, growth or innovation with a control group to measure the effects of the intervention (see, for instance, Martin et al. 2011; Garone et al. 2015; Engel et al. 2013). Other methods such as social network analysis or agent-based modelling, potentially better suited for capturing the dynamic and agent-centred dynamics of clusters, are very rarely used in cluster policy evaluation.

Existing evaluations generally demonstrate moderately positive effects of cluster support on firm performance (Falck et al. 2010; Garone et al. 2015; Engel et al. 2013; Viladecans-Marsal and Arauzo-Carod 2012). But there is no clear and unambiguous evidence that cluster policy is consistently able to deliver impacts in terms of innovation, productivity or employment (Uyarra and Ramlogan 2016; Ketels 2013). Impact assessment studies are case-by-case analyses 'focused on improving the specific policy program in place, not on broadly learning about better cluster policy' (Ketels, 2013: 264).

Furthermore, evaluations tend to focus on explicit (and more visible) policies to support clusters, neglecting the influence of non-cluster policies at different levels (Magro and Wilson 2013) and other contextual factors. As noted by Aranguren et al. (2014: 1551), quantitative studies showing tangible outcomes may be attractive to policymakers seeking to legitimize their policies, yet 'such analyses can be misguided if they occur in isolation without a contextual appreciation of the policy'. The actual impact may depend as much on the way the policy is conducted and implemented as on whether the rationale for its use is correct or not.

Indeed, the development of clusters is influenced by a diversity of context-specific factors, the relative importance of which is difficult to identify. One of these key factors is the concrete implementation of instruments and the role of cluster facilitators. The facilitation role seems to be of particular significance for cluster growth and development. For

instance, the evaluation of the Vinnväxt clusters acknowledged the role that cluster management played in building networks of connections. Based on survey evidence drawn from 132 participating enterprises within the Arena programme, the evaluation of this programme in Norway showed the importance of the personal characteristics of the cluster facilitator in making the cluster project's activities relevant to the participating enterprises (Uyarra and Ramlogan 2016). The role of actors in policy is, however, obscured in large-scale statistical modelling studies of the economic effects of policies.

2.7 CONCLUSION

Academic and policy interest in clusters has emerged from the observation that many industries tend to cluster and the *ex post* analysis of the economic and innovation performance of a number of high-profile clusters. However, the popularity of this concept is 'by no means a guarantee of its profundity' (Martin and Sunley 2003: 5), and considerable controversy remains around the benefits of clusters, their evolution, and their use in policy.

In particular, a strong controversy surrounds the capacity of the public sector to 'create' clusters. It has been argued that the propensity to cluster in many industries is arguably neither a sufficient guide for policy nor a strong rationale for intervention, once the potential downsides and political risks are factored in. This notwithstanding, the cluster model has proved to be a seductive proposition for policymakers, and has been used extensively as a means to foster innovation and competitiveness in a variety of national contexts.

We started this chapter reflecting on the gap that exists between the popularity of the cluster concept and the lack of knowledge on policy implementation and policy learning. Research on cluster development is increasingly concerned with life cycle stages and the interaction of multiple factors and institutions at various spatial scales, as well as the role of actors as 'change agents'. This suggests a need for better integration of policy in cluster development on the one hand, and on the other, a need to adopt a more agent-centred and dynamic view of cluster policy and cluster policy evaluation.

Cluster policy is a multidimensional, multi-instrument policy, informed by a mix of rationales. Differences in cluster initiatives are, therefore, a product of not only different objectives, instrument choice and implementation styles, but also context-specific institutional configurations, policy path dependencies and different types of government intervention.

However, these considerations, and the relevance of politics in shaping cluster initiatives, have not been given sufficient attention in the literature.

We therefore argue that research agenda on cluster life cycles would benefit from a better appreciation of policy dynamics. This would include a better understanding of the real (and changing) rationales of cluster policies, including the role of politics, a better appreciation of the broader governance and institutional context and policy mixes in which the new policy is embedded, and attention to the precise policy design and actor configuration responsible for implementing the policy. This in turn suggests a need to shift our attention away from heroic attempts at mechanistic evaluation and employ a mix of approaches more suitable to capturing both network evolution and learning processes in relation to public policy interventions.

NOTES

1. While there are no official statistics of the number and types of cluster type interventions worldwide, the Global Cluster Initiative Survey identified about 500 cluster initiatives, mostly in Europe, North America, Australia and New Zealand (Sölvell et al. 2003) and the European Cluster Organization directory lists more than 1,200 cluster organizations in 216 regions.
2. Indeed, most of the country reviews of cluster policy undertaken by Oxford Research AS on behalf of the EC (European Cluster Observatory, www.clusterobservatory.eu) report that for most national programmes 'no evaluation has yet been done'.
3. Academic contributions generally link the evolution of clusters with industry and technology life cycles. Dynamic clusters are associated with the early stages of industry, where clustered firms are perceived to perform better than non-clustered firms. Clustering becomes less of an advantage as the technology-industry matures (Audretsch and Feldman 1996), and there is a tendency for network structures to become stronger, with a tendency towards lock-in (Ter Wal and Boschma 2011).
4. A compendium of evidence on the effectiveness of innovation policy – See: http://www. nesta.org.uk/project/what-works-innovation-policy/innovation-policy-evidence#sthash. IlkIWb9f.dpuf.

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