

# 4 Towards a revised cluster policy for Piedmont, Italy

---

Despite its strong innovation clusters, Piedmont faces important policy challenges to economic development, including low labour productivity and human capital. This chapter examines how Piedmont's cluster model and governance can be upgraded to respond to global megatrends and their impact on Piedmont's emerging industries and competitiveness. The chapter starts with a description of the current cluster model in Piedmont and why it needs a rethink. The chapter then proceeds with suggesting a revised cluster model based on three pillars of strong industrial innovation clusters: i) reinforcing the role of clusters as drivers of the regional innovation system, (ii) strengthening cluster collaboration across borders, and (iii) using clusters to support regional vision-setting for future technological and industry development, including advancing social and environmental innovation practices. Addressing these pillars, the chapter discusses how to better integrate the themes of entrepreneurship, digital transformation, innovation diffusion, and up- and re-skilling in cluster programmes.

---

# In Brief

## Piedmont's clusters could become strong partners for a green, digital and inclusive industrial transition

- **Piedmont's seven innovation clusters successfully support innovation and economic growth in innovation-oriented firms.** They facilitate access to public funding from the region to innovative firms, including small and medium-sized enterprises (SMEs), for collaborative research and development (R&D) projects. They also play an important role as knowledge brokers by bringing together innovative SMEs, universities and large firms in the region.
- **The region's innovation clusters are less successful in preparing companies not at the forefront of innovation to manage the large-scale challenges,** such as industrial transition, digitalisation and moving to a net-zero carbon economy. There are several reasons behind this. First, many innovation actors perceive the cluster's role to be limited to facilitating access to Cohesion Policy funds. Second, cluster membership has remained stagnant for the past five years, with some exceptions (e.g. the Agrifood cluster). Finally, clusters seem to reinforce incumbents but do not always encourage the industrial diversification of local firms into new and related activities. Without overcoming these challenges, clusters risk being unable to sustain their current role and face a threat of decline.
- **It is imperative to upgrade the role and capacity of clusters as central innovation actors.** The region should use the next iteration of its cluster policy and cluster model to help clusters better respond to changing industry needs and meet regional innovation and development objectives. A revised cluster policy should ensure that entrepreneurship, digital transformation, innovation diffusion, and up- and re-skilling are well integrated into cluster programmes.
- **A revised model based on three critical pillars – or focus areas – could drive an upgraded cluster policy that concentrates on innovation, innovation diffusion and productivity growth.** First, making use of clusters as drivers of the regional innovation ecosystem would help Piedmont strengthen cross-sectoral linkages between firms. By favouring collaboration among firms and knowledge spillovers, these linkages play a central role in industrial transformation, the development of emerging industries and innovation. Next, cluster internationalisation is a key driver of transformation and growth for firms and the ecosystem in which they operate. Finally, by providing intelligence to the region, clusters help future-proof innovation policies in important regional development areas, such as the transition to a net-zero carbon economy, the digital transformation and inclusive territorial development.

## Introduction

Since the 1990s, researchers have emphasised the importance of economic clusters and cluster (management) organisations in economic and innovation development. For the purpose of this chapter, the former is considered to be a regional ecosystem of related industries (e.g. a group of firms, related economic actors and institutions) that is “located near each other and have reached a sufficient scale to develop specialised expertise, services, resources, suppliers and skills” (European Union, 2021<sup>[1]</sup>). It is generally referred to as an economic or an innovation cluster. The latter term refers to an entity that supports the strengthening of collaboration, networking and learning in economic clusters and provides innovation support by offering or channelling specialised and customised business support services to stimulate innovation activities (European Union, 2021<sup>[1]</sup>). Many studies have asserted that economic (or innovation) clusters generate benefits for their associated enterprises, for example easier and affordable access to means of production, distribution channels, human resources, or knowledge and innovation (Audretsch and Feldman, 1996<sup>[2]</sup>) (Delgado, Porter and Stern, 2014<sup>[3]</sup>) (Litzel, 2017<sup>[4]</sup>). Innovation clusters can also strengthen a country’s or region’s international competitiveness through stronger external linkages and better integration in global value chains (Bathelt, 2001<sup>[5]</sup>). To properly provide these benefits, cluster management organisations need the right competences, sufficient visibility, and the trust of local and regional innovation actors (OECD, 2018<sup>[6]</sup>).

Recent OECD work highlights the importance of clusters as an “innovation governance tool” for policy makers (OECD, 2019<sup>[7]</sup>). Across OECD regions, policy makers turn to innovation clusters to support local industrial modernisation and smart specialisation strategies, which emphasise strong interactions among different public and private innovation actors (OECD, 2020<sup>[8]</sup>). Clusters can support innovation governance by bringing together the interests of relevant innovation stakeholders, such as higher education institutions, large and small companies, the public sector, innovation intermediaries, etc. Cluster structures, often supported through a cluster initiative (such as a cluster organisation)<sup>1</sup>, can facilitate communication between firms and public institutions to define policies and actions that support regional competitiveness (OECD, 2009<sup>[9]</sup>). This is particularly important for regions in industrial transition, such as Piedmont, that need to prepare local industries for current megatrends, such as digitalisation, technology shifts, and the growing complexity and interdependence of research and development (R&D) activities.

Innovation clusters have a strong history in Piedmont, but they face challenges. In 2009, Piedmont established 12 cluster management organisations (*Poli di Innovazione*). Each related to different technology domains in traditional and high-tech industries. In 2015, the cluster organisations were re-organised to better reflect the region’s smart specialisation and innovation priorities. Today, the region has seven cluster management organisations that seek to support innovation in the smart specialisation strategy areas (OECD, 2020<sup>[10]</sup>). Their purpose is to channel public funding from European funds to collaborative R&D projects, and they are well-established knowledge brokers between firms and institutions/public bodies. These cluster management organisations also host trade fairs, help firms participate in them, and build relationships with other cluster organisations in Italy and internationally. Yet, there are (policy) challenges associated with the region’s cluster organisations. The full strategic potential they offer is not fully tapped, and their contributions to advancing smart industrialisation and digital transformation in Piedmont could be further leveraged. In addition, some clusters organisations have a narrow activity focus and there is room to broaden SME membership and support activities in pursuit of regional innovation objectives.

The revision of Piedmont’s smart specialisation strategy and its regional innovation policy for the 2021-2027 European Union (EU) Cohesion Policy funding period provides an important opportunity for Piedmont to review and upgrade its current cluster policy and model. Upgrading the current cluster model fits within the regional government’s activities to revise its smart specialisation strategy and broader innovation policy as part of the 2021-2027 EU Cohesion Policy funding period. It is a particularly important exercise because

innovation clusters in Piedmont are meant to deliver on a range of objectives that can support the region's development and which are associated with national and EU level objectives as well.

This chapter offers recommendations on how Piedmont's clusters can strengthen innovation and knowledge-based development throughout the region. The chapter is organised in three main parts. First, it describes Piedmont's existing cluster model and its evolution. Second, it identifies the major challenges that Piedmont's innovation clusters face in supporting innovation. Third, it discusses how the current cluster model can be upgraded based on OECD experience and international learning models.

## **Piedmont's cluster policy and cluster model: 2009-2020**

The development of cluster policies and programmes in Piedmont began in 2009 with the creation of 12 regional cluster organisations, building on a long tradition of industrial districts in Italy. In 2015, after a review process, the region merged the 12 cluster organisations into seven new ones. They reflect the priorities outlined in the region's Smart Specialisation Strategy (RIS3) for the 2014-2020 EU Programming Period: aerospace, automotive, green chemistry/cleantech, mechatronics, "Made In" (agri-food and textile), and life sciences (OECD, 2020<sub>[10]</sub>).

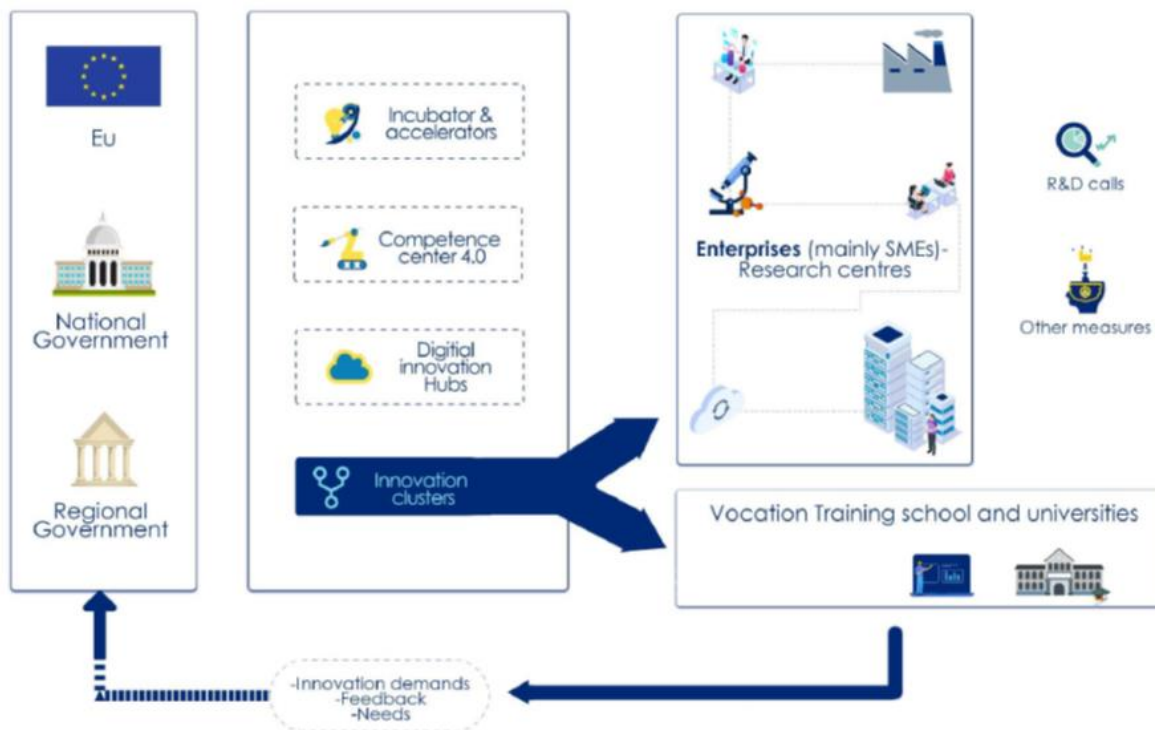
### ***Objectives of Piedmont's cluster policy***

The objective of Piedmont's cluster policy since 2015 has been to use innovation clusters to improve Piedmont's economic competitiveness through well targeted research and innovation. Innovation clusters in Piedmont are specifically focused on industrial modernisation, to be achieved through:

- the diffusion of digital skills, tools, and applications
- cross-sectoral technology fertilisation
- collaboration (e.g. large and small firms, industry and academia).

Piedmont's innovation clusters do not operate in a vacuum, but are part of a broader innovation environment (Figure 4.1). While clusters are a central instrument of regional innovation policy in Piedmont, other actors such as competence and technology centres, incubators, vocational training schools and universities also provide important innovation support services (see Chapter 2). One of the tasks that innovation clusters and cluster organisations strive to fulfil – with mixed results thus far – is to connect the different actors within the regional innovation ecosystem in order to maximise the impact of innovation policy support by all stakeholders.

Figure 4.1. The role of the innovation clusters in Piedmont's regional innovation policy



Source: (OECD, 2020<sub>[10]</sub>); Updated by the Regional Government of Piedmont, July 2021

### ***The organisation of Piedmont's regional clusters***

The Piedmont regional economic clusters unite innovation actors in a specific sector or technology. Each regional innovation cluster – not to be mistaken for cluster management organisation – consists of groupings of independent companies (innovative "start-ups", SMEs, large enterprises, research organisations, etc.) active in a particular sector and/or technology. They function as innovation ecosystems in the region that promote the transfer of technologies, the sharing of structures and the exchange of skills and knowledge between members.

Each cluster organisation in Piedmont has between five and nine staff dedicated to the cluster's management. The main services offered to cluster members are matchmaking, support for (R&D) project development, support to access financing and technology transfer. The number of participating firms - mostly SMEs - in each cluster ranges between 86 and 237, representing an industry coverage between 7.7% and 20%, depending on the sector (Table 4.1). It is important to highlight that start-ups, for reasons explained in further detail below, generally do not participate in activities sponsored by cluster management organisations. The different cluster specialisations may partially explain the difference in industry coverage. While some cluster organisations cover Piedmont's traditional industrial sectors (e.g. the agri-food and textile clusters) others are cross-sectoral by nature, covering large-scale enabling technologies and larger industries (e.g. mechatronics as in the case of the *MESAP* cluster, Information and Communication Technologies as in the case of the ICT cluster).

**Table 4.1. Overview of the coverage and organisation of innovation clusters in Piedmont, 2019**

| Cluster Organisation | Main industries served                            | Number of members (industry coverage in percentage) | Number of staff dedicated to cluster management |
|----------------------|---|---|---|
| bioPmed              | Life Sciences                                     | 93 (20%)  | 5   |
| C-Green              | Green Chemistry and Advanced Material             | 164 (15%)   | 9   |
| Clever               | Energy and Clean Technologies                     | 165 (10%)   | 8.5   |
| MESAP                | Smart Products and Manufacturing                  | 265 (10%)   | 8   |
| Pointex              | Textile   | 95 (10%)  | 5   |
| Polo Agrifood        | Agriculture and Food                              | 197 (15%)   | 5.5   |
| Polo ICT             | Information Technology and Analytical Instruments | 239 (7.7%)  | 8   |

Source: (OECD, 2020<sub>[10]</sub>).

Total revenues of the cluster management organisations and the number of staff they employ differ significantly, reflecting the heterogeneity of the clusters and their associated partners. Revenues for the *Clever* cluster are almost three times higher than those of the *Pointex* cluster. All cluster organisations depend on support from the European Regional Development Fund (ERDF) administered by the Piedmont regional government. The *Polo Agrifood* cluster relies on ERDF for 66% of its revenues, the highest among the seven clusters. This is in contrast to the ICT cluster, which depends on ERDF financing for about one-third of its revenue, generating most of its income from other sources of funding (Table 4.2). All cluster organisations generate additional revenues from such sources as membership fees, fees for services or other EU funds (e.g. COSME). Yet, they mostly rely on ERDF financing, which is problematic for several reasons. EU funding processes, rules and regulations can be cumbersome to navigate for some firms, particularly small ones, which can prevent them from accessing necessary firms. They require project design and management expertise, co-financing, which might not always be available, and they are considered very bureaucratic. Furthermore, an overdependence on EU funds casts doubt on whether the clusters, and particularly the cluster organisations, would survive without public support, calling into question their long-term sustainability if they continuously depend on external funding for a significant percentage of their financing.

**Table 4.2. Innovation cluster revenue and sources of funding in Piedmont, 2018**

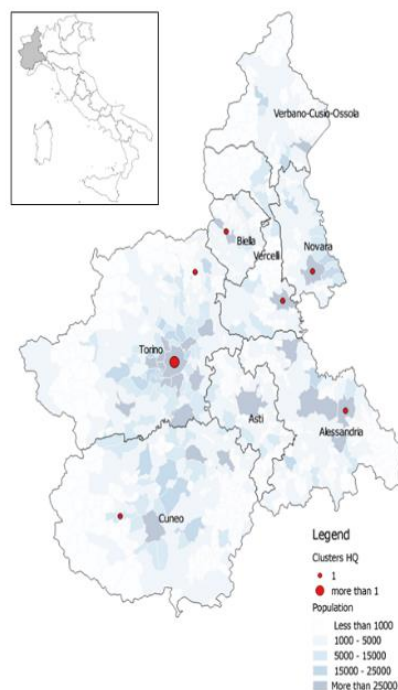
| Cluster       | Total cluster organisation financing (EUR) | Sources of financing         |   |
|---------------|--|------------------------------|---|
|               |  | Regional funds (ERDF) in EUR | Other co-financing (membership fees, services, EU funded projects, in kind) |
| bioPmed       | 453 000                                    | 200 000 (or 44%)             | 253 000 (or 56%)  |
| CGreen        | 700 000                                    | 296 000 (or 42%)             | 404 000 (or 58%)  |
| Clever        | 840 000                                    | 350 000 (or 42%)             | 490 000 (or 58%)  |
| MESAP         | 619 000                                    | 205 000 (or 40%)             | 414 000 (or 60%)  |
| Pointex       | 285 000                                    | 135 000 (or 47%)             | 150 000 (or 53%)  |
| Polo Agrifood | 444 000                                    | 292 000 (or 66%)             | 152 000 (or 34%)  |
| Polo ICT      | 827 000                                    | 265 000 (or 32%)             | 562 000 (or 68%)  |

Source: (OECD, 2020<sub>[10]</sub>).

Innovation cluster organisations in Piedmont are headquartered throughout the region, either in Turin, or the area with the largest concentration of firms already operating in the cluster's specific industrial sector (Table 4.2). For example, the Agri-food cluster is located in Cuneo, in the south-west of Piedmont. While the location of innovation cluster organisations reflects local production and industry agglomeration

patterns, clusters serve the entire region. Expanding the membership base of innovation clusters within the region beyond their traditional catchment area is one of the objectives the regional government assigns to the cluster organisations.

**Figure 4.2. The location of innovation cluster headquarters in Piedmont**



Source: OECD elaboration.

### Why cluster policy in Piedmont needs a rethink

Piedmont's cluster organisations have successfully channelled public funding for collaborative R&D projects. Yet, they have been less successful in accompanying companies through industrial transition. In the ten years since their establishment, Piedmont's cluster organisations have proven to be successful innovation actors, able to facilitate access to public funding (mainly the ERDF) for collaborative R&D projects. The open question, however, is whether the cluster organisations are sufficiently proactive and capable to accompany associated companies through the industrial transition underway in Piedmont. Looking ahead, cluster organisations must be prepared to support businesses during the recovery from the COVID-19 pandemic and to embrace global megatrends and their impact on emerging industries in Piedmont. Some megatrends relate to the diffusion of new disruptive technologies (e.g. automation), others are more closely related to demographic, socio-political, environmental and economic shifts (e.g. demographic shifts and the transition to a green and circular economy). These megatrends pose both significant challenges and opportunities for emerging industries in Piedmont by affecting business models, creating incentives or barriers to developing new markets, altering employment and productivity, causing shifts in skill requirements and disrupting existing value chains. Strengthening regional resilience in light of these megatrends requires a broader cluster vision than the current one and strengthened capabilities among cluster organisations to help local firms navigate these trends (OECD, 2019<sup>[7]</sup>).



Currently, the regional cluster organisations face a range of challenges, which they need to overcome in order to continue supporting industrial modernisation in Piedmont. Without overcoming these challenges, regional cluster organisations will not be able to use their full potential to advance smart specialisation and digital transformation in the region. The solution to overcome present challenges is not to abandon the role of innovation clusters and cluster organisations as central innovation actors, but, on the contrary, to upgrade the current cluster policy and cluster model so that Piedmont's regional clusters can better respond to changing industry needs, regional innovation and development objectives.

Piedmont's innovation cluster organisations have contributed significantly to the competitiveness of their member companies (IRES Piemonte, 2020<sub>[11]</sub>). This contribution is evidenced, for example, by a 6% average increase in annual firm revenue among cluster members in the first three years of membership<sup>2</sup>. Furthermore, belonging to an innovation cluster can be a decisive factor in a company's decision to innovate and to search for new business partners (OECD, 2020<sub>[12]</sub>). The contribution of innovation clusters to Piedmont's regional development is also illustrated by the level of R&D activity in the region (Table 4.3). Between 2017 and 2020, overall R&D investments activated by the cluster members amounted to more than EUR 200 million. Nearly 1 000 companies were involved in these activities, with a contribution of 2 100 full time equivalents (FTE)<sup>3</sup> of cluster organisation staff. Overall, contracts with a volume of over EUR 27 million were activated with research centres in R&D cluster projects (OECD, 2020<sub>[10]</sub>). This contribution, however, varies significantly by cluster. For example, while the *MESAP* Smart Products and Manufacturing cluster activated EUR 80 million in R&D investments, the *Pointex* Textile cluster activated EUR 21.5 million.

**Table 4.3. Activated investments in R&D projects in million EUR by innovation cluster, 2015-2018**

| Cluster                                | bioPmed - Life Sciences | CGreen - Green Chemistry and Advanced Material | Clever - Energy and Clean Technologies | MESAP - Smart Products and Manufacturing | Pointex - Textile | Polo Agrifood | Polo ICT |
|--|-------------------------|--|--|--|-------------------|---------------|----------|
| Amount of R&D activated in million EUR | 31.9                    | 35   | 56.3                                   | 80                                       | 21.5              | 35.8          | 41.8     |

Source: (EOCIC, 2018<sub>[13]</sub>)

Despite the successes, there is a pronounced risk that the performance of innovation clusters in Piedmont will decline over time, reducing their ability to support industrial transition. A gradual decline could set in if the regional innovation clusters are unable to adapt to changing markets and new technologies. This is well explained by the cluster life-cycle model (Box 4.1). The model argues that innovation clusters undergo different stages of development, starting with their emergence and followed by stages of growth, sustainment and potentially decline. Decline can be avoided if innovation clusters manage to a) renew and grow their membership base and activities, and b) adapt to changing market and technology needs. Piedmont's innovation clusters, and particularly its cluster organisations, were created in 2009 and re-organised in 2015, and were marked by an initial phase of growth. There are a number of arguments, elaborated in the bullet points below, indicating that Piedmont's innovation clusters have reached a stage of sustainment, which leads to decline if no action is taken:

- Many innovation actors perceive the cluster organisations' role to be one of facilitating access to Cohesion Policy funds. This means that those firms that do not wish to apply for such funding (due to lack of need, or due to excessive administrative burden) or do not have the capacity to participate in R&D networks, do not join cluster organisations. This perception may be compounded by the fact that the innovation cluster networks cover a limited number of firms, which further restricts the scale of their activities. This has several implications. First, small, and especially micro, companies shy away from cluster organisation participation, as they do not feel "ready" or "innovative enough" to participate in cluster activities or might not have the financial resources for membership. Second, especially for SMEs, innovation is more about organisational and management innovation, which cluster organisations are not perceived as supporting. Third, cluster organisations may find it



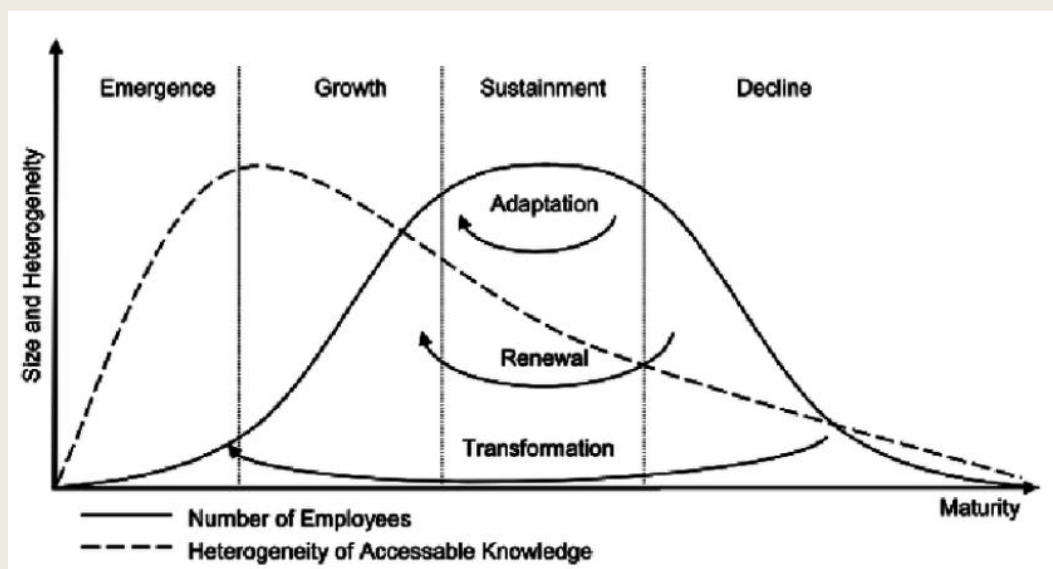
difficult to establish closer relationships with universities because the universities do not consider them as true counterparts in their work (OECD, 2020<sub>[12]</sub>). More and better engagement with the universities could help develop the cluster organisation/university relationship and expand innovation opportunities for both.

- Coverage of the industry is moderate for some clusters and cluster organisation membership is stagnant. One of the major criticisms of Piedmont's cluster organisations by regional innovation stakeholders is their lack of effort to engage with an increasing number of firms, especially small and micro-enterprises (OECD, 2020<sub>[12]</sub>). This might be related to the narrow sectoral focus of some cluster organisations. While some concentrate in broader and/or more traditional industrial sectors, such as the agri-food and textile clusters, other cluster organisations are more focused, such as the energy and clean technology cluster. It might also result from a political choice to focus regional policies on supporting R&D innovation, with potentially insufficient policy support for non-R&D innovation. Non-R&D innovation encompasses innovation methods that do not involve R&D activities, such as product or process innovation, and it can be just as powerful as R&D innovation. If the region would like to use cluster organisations to support innovation and innovation diffusion in small and micro firms that are not active in R&D innovation, then the scope should be broadened. This includes expanding the definition of innovation and matching the support and activities offered by clusters to the needs, interests and capacities of small and micro firms that do not have sufficient internal innovation capacities.
- Innovation clusters reinforce incumbents but do not always encourage industrial diversification. There are unexploited opportunities for cross-fertilisation among Piedmont's clusters. An innovative technical solution can often be transferred across sectoral value chains, which may lead to the emergence of new products or the transformation of processes that had previously appeared unrelated. Research and innovation projects managed by the region's clusters should not be strictly limited to projects falling within their scope of activity.
- There is a lack of collaboration among innovation clusters, organisations, and other actors in Piedmont's regional innovation system. For example, innovation clusters do not yet systematically capitalise on the strengths of Piedmont's three public universities. There is also little cooperation between the innovation clusters and the university incubators, although this is linked to 2014-2020 regulations that hinder start-ups from participating in projects supported by EU Cohesion Policy funds. Specifically, companies that wish to tap into these funds must prove a certain number of years of established economic returns - something that is not possible when a company is young. However, the region should take action to overcome this shortcoming, for example by launching a specific call targeted at start-ups and where they do not have to meet the same requirements as in the "regular" R&D calls. Finally, little cooperation takes place between cluster organisations and private sector actors, such as the bank foundations (OECD, 2020<sub>[12]</sub>).
- Some cluster organisations provide strategic guidance for future industry developments, but not all appear to have the capacity or willingness to do so. Cluster organisations could potentially play a greater role in vision-setting for regional innovation policies by contributing to the development and communication of medium- and long-term research and technology development objectives and maintaining close contact with the European Technological Platforms. For this to occur, each cluster manager would need to have the required competencies and industry experience. Such expertise may not be equally distributed among Piedmont's clusters (OECD, 2020<sub>[12]</sub>). Cluster organisations in Piedmont could also go further with new policy approaches and integrated strategies to solve regional societal and environmental challenges.

### Box 4.1. The cluster life-cycle model

Innovation clusters follow different developmental stages: emergence, growth, sustainment and decline. A cluster's transition from one stage to another is based on learning processes among the cluster members and the resulting changes in the cluster knowledge base's heterogeneity. To move from the emergence to the growth stage, a thematic focus is necessary. During the growth phase, the number of firms that form the cluster grows, the firms themselves grow in terms of employees, and the firms become increasingly interconnected. Cluster members learn from one another through observation, interaction and cooperation. This leads to an initially high rate of innovation activities. But, at the same time, knowledge heterogeneity in the cluster decreases and firm knowledge bases become increasingly similar. Therefore, in the sustainment stage new knowledge needs to be brought into the cluster. Such knowledge needs to maintain a level of heterogeneity that is high enough for the cluster members to learn something new from one another, but at the same time low enough that the members in the cluster can benefit from synergies and agglomeration externalities. When the cluster does not increase knowledge diffusion, local actors may be attracted to inferior routines and solutions. The automobile cluster in Detroit is an example of this. After the growth stage with extensive funding for start-ups, this cluster relied extensively on leading companies such as Chrysler and Ford without bringing in new knowledge and eventually declined. Examples of sustaining clusters that managed to escape decline can be found in Baden-Württemberg. Those clusters constantly renewed connections of companies within the cluster to outside companies.

Figure 4.3. Quantitative and qualitative dimensions of the cluster life-cycle model



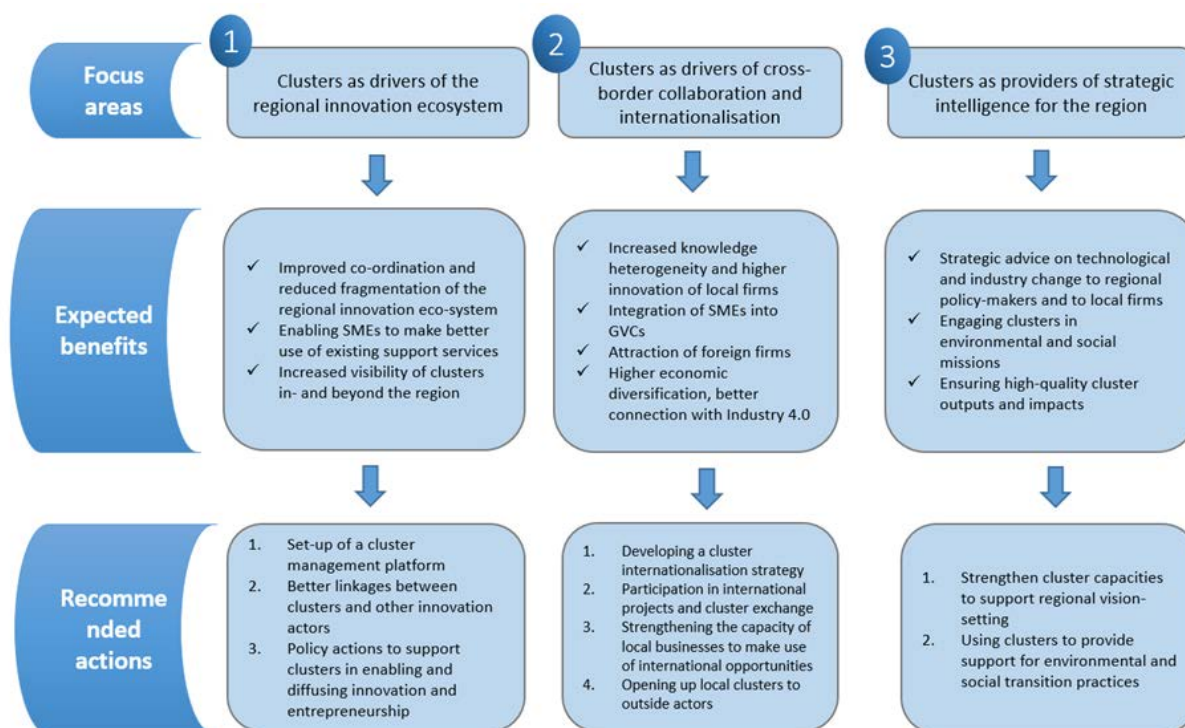
Source: (Menzel and Fornahl, 2010<sup>[14]</sup>) (Andersson, Evers and Griot, 2013<sup>[15]</sup>)

### Towards an upgraded cluster policy for Piedmont

Supporting industrial modernisation through innovation clusters and avoiding cluster decline requires relevant stakeholders, such as policy makers in Piedmont, to investment in maintaining strong, professional clusters. To stay relevant for the region, the innovation clusters in Piedmont need to create high value for the region in the form of innovation, knowledge provision, growth, solutions to societal challenges, international collaboration and attracting investments. To fully utilise the potential of their

innovation clusters, policymakers in Piedmont may want to pursue action in three areas that are associated with supporting innovation and productivity growth through clusters, and that need to be strengthened in the current Piedmont cluster model (Figure 4.4).

**Figure 4.4. Overview of proposed strategic goals, expected benefits and recommended actions of a revised cluster model for Piedmont**



Source: OECD elaboration.

Action in the three focus areas should underpin regional cluster policy objectives to build a cohesive cluster structure, new emerging growth areas, innovation in industries, as well as inclusive development throughout the region. It should further ensure an effective and cohesive cluster infrastructure in Piedmont that is attractive to enterprises (both SMEs and large enterprises) as well as knowledge institutions and other relevant innovation actors. In more specific terms, the objectives of each focus area are:

- To strengthen collaboration among the different innovation clusters and their managing organisations, and with other actors in the regional innovation ecosystem, so that greater cohesion and synergy is created within the regional innovation ecosystem and in overall innovation and enterprise policy efforts (Focus area 1).
- To strengthen the internationalisation of Piedmont's innovation clusters so enterprises can access leading international knowledge and international business partnerships (Focus area 2).
- To ensure the innovation clusters contribute to new and emerging priorities in innovation and regional development, such as the digital transition and the transition to a net-zero economy (Focus area 3).

This can be achieved through the delivery of a joint and coordinated cluster policy by the regional government and the individual cluster management organisations. It should be noted that this vision and

the objectives do not stand in contrast to the current cluster policy objectives. Instead, they aim to further strengthen the role of clusters as innovation actors in the regional innovation ecosystem and to help the clusters, and cluster organisations, take on new roles and responsibilities in response to current megatrends and changing regional development needs (see Chapter 1).

The remaining sections of this chapter assess the status quo in Piedmont for the three proposed focus areas, including urgent bottlenecks and major challenges for the region. For each of these areas, the current cluster model in Piedmont will be evaluated in light of today's biggest challenges, such as the COVID-19 pandemic and megatrends (e.g. globalisation, digitalisation and new technologies, and the transition to a climate-neutral and circular economy), and against international good practices. Recommended policy actions are proposed to address the cluster-related challenges confronting innovation policy and its implementation. Importantly, challenges to innovation and innovation policy cannot be viewed in isolation but are interdependent. For example, integrating SMEs into global value chains requires providing them with access to foreign markets, and enhancing the ability of companies to use such opportunities. Since effective cluster policies need to take into account complementarities between different pillars of innovation support, the following analysis emphasises potential overlaps and complementarities of policies in the various areas of cluster and innovation policy in Piedmont.

## Focus area 1: Innovation clusters as drivers of the regional innovation ecosystem

A variety of regional stakeholders working for the clusters, universities, incubators and the non-profit foundations have shared their desire for innovation clusters, and cluster organisations, to take on a stronger role in connecting different regional industries to strengthen the regional innovation ecosystem (OECD, 2020<sup>[12]</sup>). Local industries in Piedmont are increasingly interconnected, for example in the ICT and the agriculture industry. Better coordination of innovation activities through the innovation clusters would support local companies so they can learn about the interconnectedness of regional industries and value chains and develop new products or business models based on emerging industries and niches. This would not just benefit local firms but also strengthen the role of innovation clusters as drivers of the regional innovation ecosystem.

Using clusters to strengthen the regional innovation ecosystem requires two lines of action. First, strengthening coordination and collaboration *among the existing innovation clusters*. This can enable knowledge and innovation spillovers between clusters and give cluster organisations a more central role as services providers and innovation advisors. Leveraging the knowledge, capabilities, and local specificities of innovation clusters to strengthen economic diversification will likely imply creating a joint cluster management structure. Second, improving the coordination *between clusters and other actors in the regional innovation ecosystem* could enhance the cohesion of regional innovation support efforts. This involves using clusters and cluster organisations more effectively to better coordinate university-industry collaborations, match regional skill supply and demand, and provide support to SMEs and entrepreneurs.

### ***Improving cluster collaboration within the regional innovation ecosystem***

Collaboration among individual regional cluster organisations needs to improve for several reasons. First, closer collaboration among the clusters will support industrial diversification. Industrial diversification refers to firm-level processes where knowledge and resources from existing industries are used in new industries. The literature differentiates between two concepts: so-called related and unrelated variety (Content and Frenken, 2016<sup>[16]</sup>). Related variety refers to different industries that build on similar types of knowledge. Diversification based on related variety is a process where firms mainly diversify into technologically related products (Boschma et al., 2009<sup>[17]</sup>). For instance, the maritime industry may apply competencies originally used to install oil platforms to the installation of offshore wind parks, thereby moving into the renewable

energy sector (Grillitsch and Markus, 2018<sup>[18]</sup>). By contrast, unrelated variety refers to industries that do not share similar knowledge. Industrial diversification (i.e. a more diverse productivity and trade structure) will be important if Piedmont is to move along its trajectory of industrial transition. Second, and looking ahead, clusters must be prepared to embrace global megatrends and their impact on Piedmont's more traditional and low-tech industries, such as manufacturing or agriculture. Some megatrends relate to the diffusion of new disruptive technologies (e.g. automation). Others are more closely related to demographic, socio-political, environmental and economic shifts (e.g. ageing, the transition to a green and circular economy, and increased urbanisation). They affect business models, create incentives or barriers to developing new markets, alter employment and productivity patterns, cause shifts in skill requirements and disrupt existing value chains (OECD, 2019<sup>[7]</sup>). These megatrends will likely blur the boundaries of traditional industries and, with that, the boundaries of the existing industry clusters, as well. Clusters will need to collaborate with each other to make sure that local companies are able to benefit from these megatrends and develop new lines of business. Third, closer cluster cooperation and collaboration will become even more important if the Piedmont government decides that cluster organisations should offer more services and reach out to more firms. Increased collaboration allows the cluster organisations to offer a broader spectrum of activities than a single cluster could afford and it brings together expertise and knowledge from different industry sectors.

*A cluster management platform could promote synergies and foster cross-sector diversification*

A cluster management platform helps disseminate information and know-how to and among the cluster management organisations and can help strengthen their role as drivers of the regional innovation ecosystem. Past cluster analysis shows that merely providing funding to individual cluster management organisations is not always the most promising way to achieve sustainable cluster development (Mueller et al., 2012<sup>[19]</sup>). One way of better coordinating and integrating cluster activities is through a cluster management platform. Such a platform can take various forms (Kergel, Meier Zu Köcker and Nerger, 2014<sup>[20]</sup>). It can be part of a broader regional development agency, a regional innovation agency, or a dedicated cluster secretariat serving all regional clusters. Whatever the design choice, each individual cluster needs a point of contact with the management platform or at least one staff member who is employed directly by the platform. This point of contact should assist the individual cluster management and provide information on the various schemes and initiatives provided to support cluster managers. A cluster management platform can provide support services to individual cluster managers, and boost networking among clusters to foster cross-cluster and cross-sectoral collaboration, including internationalisation activities (OECD, 2009<sup>[9]</sup>). The cluster management model established in Baden-Württemberg, Germany offers a good example of a platform that combines an overall cluster portal with a cluster agency providing dedicated services to cluster managers (Box 4.2).

### Box 4.2. *ClusterAgentur*: Baden-Württemberg's regional cluster agency

In Baden-Wuerttemberg (Germany), there are a considerable number of well-established regional clusters. Practical experience highlights that close relationships between the cluster management organisations and the respective member companies can create concrete added value for their members. This is the case for finding new business partners or entering into new collaborations with regional universities. This in turn calls for a high level of professionalisation and individual, demand-oriented services on the part of the cluster and network management.

The region's cluster agency, *ClusterAgentur*, is a service provider for the regional cluster initiatives, networks and cluster policy in the German region of Baden-Wuerttemberg. The cluster agency's objective is to train the cluster managers to offer their members tailor-made services. Together with the cluster initiatives and regional networks in Baden-Wuerttemberg, *ClusterAgentur* develops new services to be implemented by the clusters in joint initiatives with their members. Furthermore, *ClusterAgentur* assists the Ministry of Economic Affairs, Labour and Housing in implementing the objectives of Baden-Wuerttemberg's cluster policy.

*ClusterAgentur* is operated in a close partnership among actors from VDI/VDE Innovation + Technik GmbH, the Steinbeis-Beratungszentren GmbH and the Baden-Württemberg International GmbH, which are all companies that provide innovation and technology services. There is also close cooperation with the various federal agencies in Baden-Wuerttemberg.

Source: <https://www.clusterportal-bw.de/en/>

Cluster management platforms can offer a broad spectrum of cluster support services ranging from a “one-size-fits all” concept to very individualised support services. The following types of support can be distinguished:

- General support activities offered to all cluster management organisations, for example public relations and marketing or cluster branding.
- Specific training focused on a particular technological and/or industrial sector or on the individual needs of a smaller group of cluster management organisations, for example on Industry 4.0 applications.
- Very specific and individual activities meeting the special needs of a single cluster management organisation, for example with regard to managerial and technical support (OECD, 2018<sup>[21]</sup>).

Offering very specific direct support and coaching to cluster management organisations is probably the most challenging type of service. It must be implemented in a tailored fashion, and must consider the individual needs of a cluster management organisation, as well as the overall objectives of the cluster. Therefore, when establishing such a support structure it is important to know what type of support service is needed and what type of service provider (with which competences) is most suitable to provide such services. In Lower Austria, Austria, the regional government charged the Lower Austria Regional Development Agency *ecoplus* with hosting the cluster management for all of the region's clusters. The agency hired a cluster manager and a cluster management team to support individual cluster organisations with advice, training, and information. An evaluation of the approach identified the following key factors of success in the Austrian context (Kergel, Meier Zu Köcker and Nerger, 2014<sup>[20]</sup>):

- Communication between the service provider (*ecoplus* in the case of Lower Austria) and the cluster management organisations is based on trust. Both groups need to perceive themselves and each other as partners. Cluster managers should not fear any negative impact or



consequences when talking about areas that need improvement and/or where training might be appropriate,

- All parties share a common understanding of the main purposes of the support services offered. The demand for additional training and support services shall not be considered a failure of the cluster management organisation, but rather as an opportunity for improvement.
- The implementation agency has sufficient knowledge of cluster management issues and current industry trends in order to be accepted by the cluster managers. Training measures should be demand-oriented, tailor-made and of high quality to ensure high levels of service acceptance and impact.
- Feedback loops after each training to ensure follow-up and/or further improve services, where needed.
- Conflicts of interest are to be avoided but could occur when the implementation agency is responsible for making decisions on cluster funding while also tasked with coaching or training a cluster management organisation on how to apply for and win funding from the same organisation.

Assigning an existing regional institution with the task of supporting the overall cluster management or creating a new agency to perform similar tasks may be considered unfeasible for financial, administrative or political reasons. If so, overall cluster management can also be supported through measures such as drumming up cluster manager participation in courses or workshops that seek to strengthen their skills in facilitating inter-cluster collaboration or exploring joint solutions to specific problems that arise in the different clusters.

Cluster management organisations can also facilitate networking and support economic diversification strategies. The benefits of regional industrial diversity have long been advanced as a fertile ground for new ideas and innovations (Jacobs, 1969<sup>[22]</sup>; Koo, 2007<sup>[23]</sup>; Frenken, Van Oort and Verburg, 2007<sup>[24]</sup>) (Koo, 2007<sup>[23]</sup>). Clusters can support economic diversification by promoting knowledge spillovers and by facilitating joint activities. The region of Bremen, Germany provides an example of how a diversification strategy can be pursued through a cluster management platform (Box 4.3).



### Box 4.3. Economic diversification through clusters in the region of Bremen, Germany

Bremen's smart specialisation strategy builds on three main clusters: i) offshore wind energy; ii) maritime industries and logistics; and iii) aerospace and aeronautics. The regional development agency, *Wirtschaftsförderung Bremen WFB*, is responsible for the overall management of innovation and economic development policies in the region. Individual clusters are coordinated by a cluster manager and support staff working within the WFB. Combining dedicated staff for each cluster and ensuring that they work for the same agency creates opportunities for cross-sectoral coordination.

One such opportunity was the development of the Maritime Safety and Security project, which was coordinated by the cluster manager for maritime industries. The manager identified a wide range of stakeholders connected to the maritime industries, including firms, research institutes, and universities, and discovered that there was a group dedicated to marine safety. They created a network in 2010, called Marissa, with monthly meetings that attracted over 20 partners, to discuss and identify new market opportunities. The firms involved include Airbus-Astrium, a satellite company of Airbus specialised in military applications but that also builds satellites for maritime applications; a company that builds drones; maritime companies like Atlas, specialised in underwater systems; and a company that builds radar systems. The WFB also developed relationships with the federal government and EU organisations.

Such a project can promote developing applications for the off-shore wind industry for example, that must manage huge volumes of staff movement between land and sea. The WFB helped obtain funding for research projects, created a bridge between business and politics, and lobbied the government to obtain favourable conditions for these firms. This network led to the creation of a data fusion centre that could provide real-time data on a wide range of conditions at sea. These data could be used by clients in the off-shore wind industry, or in ship transportation, to deal with safety and security issues, including piracy attacks on container ships. This is being developed by private partners, but the WFB was involved in helping write the funding application and had coordination responsibilities.

Source: (Marques, 2021<sup>[25]</sup>)

### **Using clusters to support university-industry collaboration**

There is potential to strengthen the interaction among Piedmont's knowledge institutions and the clusters. Doing so can create greater cohesion and synergy in overall research and innovation policy activities, which seem sometimes disconnected in Piedmont, especially with regard to supporting innovation diffusion in lagging companies (OECD, 2020<sup>[12]</sup>). A principal purpose of regional clusters is to build knowledge bridges between knowledge institutions and the business community, thereby enabling new research and knowledge to be quickly and efficiently shared and utilised (OECD, 2009<sup>[9]</sup>). One particular task of regional innovation clusters is to offer enterprises a single access point to the various knowledge institutions that exist within the network's professional field, including the regional universities and training institutions.

#### *Strategic collaboration between clusters and universities on regional knowledge transfer*

The regional government of Piedmont should encourage universities to strengthen their engagement with the innovation clusters in order to deepen knowledge exchange with the local business community. Clusters can be a particularly effective instrument to promote dialogue among educational institutions and Piedmont's many SMEs that do not currently engage with a local university. The collaboration can focus on delivering collective dissemination of knowledge to cluster enterprises, providing easier access for clusters and their members to research findings and infrastructure, as well as facilitating greater

involvement of SMEs in collaboration projects. Today, universities in Piedmont participate in the work of clusters as part of joint project work in (EU-) funded R&D projects, but there are opportunities to strengthen their engagement with local industry. To structure the dialogue with universities, the regional government will need to boost its active engagement with key university representatives and identify how to strengthen their strategic collaboration with clusters and cluster organisations. The region could, for example, integrate both cluster managers and university representatives in continuous stakeholder engagement roundtables on regional innovation policy. Doing so would enable Piedmont's universities to reach out to companies, particularly SMEs, in the region that do not yet work with the universities. Other possible measures include student placement schemes, or the development of curricula that are linked to industry needs.

*Strengthened interaction on education programmes that match the needs of companies*

Cluster organisations in Piedmont should further support the co-creation and development of educational material and curricula. Currently, clusters communicate industry needs mostly to the *Istituti Tecnici Superiori* (ITS), but less so to the local universities. Clusters could complement this by facilitating *ad hoc* partnerships between companies and universities to work on curriculum design and co-author educational materials when appropriate. This could allow companies to contribute to defining and developing the scope of curricula so that education programmes fit better with current and future skill demand. Working with local universities could also allow educators to enhance the level to which their curricula prepare students for their first jobs (OECD, 2020<sub>[26]</sub>). Partnerships with universities can also focus on reskilling or upskilling company employees. As part of a life-long learning effort, professionals could be enrolled in educational tracks tailored to their career phase and skills needs (OECD, 2020<sub>[27]</sub>). Creating such tracks requires intensive coordination between the companies and the universities on the partnerships and educational tracks' content and structure, and ultimately how they are developed and funded. Cluster organisations could facilitate this. This may, in turn, require financial contributions from the private sector (OECD, 2020<sub>[26]</sub>). The regions of North Middle Sweden (Sweden) and North Brabant (the Netherlands) provide examples of collaboration between higher education institutions and the regional business community (Box 4.4).

#### Box 4.4. Examples of collaboration between innovation clusters and higher education institutions

A recent survey conducted by the European Observatory for Clusters and Industrial Change (EOCIC) in 10 European regions found that there is significant room for improvement in terms of co-developing educational curricula with the private sector. In fact, less than 30% of survey respondents agree that joint curricula exist at university level. Examples from the North Brabant region in the Netherlands, and North Middle region in Sweden illustrate that collaboration between the regional business communities and higher education institutes can extend to the development of curricula and education policies to match industry needs.

##### North Brabant region, the Netherlands

In *Brainport Eindhoven*, located in the North Brabant region, technologies and networks are clustered around five thematic campuses in order to create economic value and facilitate business development. All of these campuses house a mix of companies and educational and knowledge institutes, thus allowing for cross-pollination between education and industry. Among other things, companies help define the curricula to ensure today's students learn the skills that those companies will need tomorrow. Likewise, the educational institutes provide interns and skilled professionals for the companies present on the campuses.

##### North Middle Sweden, Sweden

North Middle Sweden faces challenges in improving access to relevant competencies in the field of advanced manufacturing and biotechnology. In order to tackle the issue, the regional priorities of advanced manufacturing are integrated into education and training policies as a means to facilitate collaboration between companies and regional education institutions. For example, Karlstad University, which is represented on the board of one of the region's innovation clusters, has been working to diversify its education schemes according to the needs of regional businesses.

Source: (European Union, 2019<sup>[28]</sup>), (Brainport Eindhoven, 2020<sup>[29]</sup>), (Kristensen and Mikkola, 2016<sup>[30]</sup>)

Cluster organisations can also support firm survival after they leave a regional university incubator. In addition to supporting training and education, universities increasingly generate new spin-offs and tech start-ups (Mathisen and Rasmussen, 2019<sup>[31]</sup>). They have become increasingly aware of the need to disseminate the knowledge within universities and of the economic and social benefits resulting from the transfer and commercialisation of academic knowledge. Piedmont hosts three university incubators, which, over time, have supported several hundred university spin-offs and technological start-ups. They offer working spaces, support in applications for seed funding, European funding and other types of financing, and mentoring. Cluster organisations could be particularly helpful to ensuring the survival of such firms, which is an issue that has been reported by many incubated start-ups emerging from the university incubators (OECD, 2020<sup>[12]</sup>). In order to do so, Piedmont's cluster organisations would need to broaden their scope of activity with regard to SME and entrepreneurship support.

#### **Supporting skills for industry through clusters**

Skills have rapidly risen to the top of the agenda for industry in Piedmont given global technological, environmental and demographic trends. These trends affect the demand and supply of different types of skills in place-specific ways. On the one hand, digitalisation and climate change are driving changes that demand particular skills. On the other hand, population ageing, which is a large problem in Piedmont,

influences the skill supply. Furthermore, the COVID-19 pandemic placed further and immediate pressures on Piedmont's labour market, also affecting skill supply and demand (Chapter 2).

Innovation clusters are an ideal focus for the collaborative dynamics essential to address regional skills shortages and mismatches. Cluster organisations can help match the supply of cluster specific skills to demand, a role that is particularly important for regions in industrial transition that struggle with high skills mismatches. By bringing together the triple helix (firms, higher education institutions and government) in a place-based context, clusters can provide critical mass and brokering capacity to effectively address regional skills imbalances (OECD, 2019<sup>[7]</sup>). Piedmont's clusters, and particularly cluster organisations, could, for example, raise awareness of skills imbalances, provide strategic intelligence on regional or sectoral trends, and communicate information on funding programmes and training initiatives. They could also design and implement *ad hoc* training activities (e.g. on cloud computing or cyber security). One concrete way of addressing skills mismatches in the region is to better link the regional clusters with the seven ITS.

### *Better linking clusters with the Istituti Tecnici Superiori*

Links among Piedmont's seven ITS and the clusters could be further reinforced. Six of the ITS based in the region focus on technological/sectoral areas that are similar to those of the clusters, and one supports the tourism industry. The ITS, similar to vocational education and training (VET) in general in Italy, suffer from a poor reputation and low visibility despite high rates of student placement in regional firms. While the ITS are connected well to Piedmont's cluster specialisations, there are opportunities to strengthen their links with the clusters. For example, technological and industrial changes are happening fast. This means that education and training programmes should be revised regularly to keep up with industry demand. Cluster organisations are also well-placed to communicate changes in industry demand to the ITS, helping balance employer needs with the skills available or that could potentially be available.

The clusters should work with local companies to encourage employers to collaborate with ITS to upgrade specific skills of their staff. In many cases, workplaces need to be restructured to accommodate changing technological and industrial realities (OECD, 2020<sup>[27]</sup>). Cluster organisations in Piedmont can play a stronger role in encouraging employers to support ongoing skill acquisition and skill upgrading among staff. They could do so by offering their employees, including managers, the time needed to learn such skills. In addition, they could create incentives and rewards for learning and skill attainment. Importantly, the skills requested by industry are not merely technical. Facing the challenges of automation and artificial intelligence, future employees need to be increasingly creative, innovative and entrepreneurial, capable of building relationships, advancing research and strengthening their organisation (OECD, 2019<sup>[32]</sup>). In addition, Piedmont's cluster organisations could more proactively work with the ITS to accustom students to working in a multi-disciplinary manner (i.e. involving multiple research areas) or proactively learning about related industries (e.g. through shared classes among the ITS). This needs to start from day one of their technical education. Such initiatives would help generate and reinforce individual and cross-sector networks, and could eventually lead to greater ease in collaboration across industries, sectors and disciplines.

### **Supporting SMEs and entrepreneurship through clusters**

Since Piedmont's cluster policy is generally linked to its innovation policy, the majority of cluster programmes attach great importance to innovation objectives. This takes place either by promoting collaborative R&D projects or by supporting the commercialisation of innovation or industry digitalisation. However, cluster programmes in Piedmont seem largely focused on supporting innovation and competitiveness in already innovative firms, and devote limited attention to promoting non-technological innovation in SMEs that need to raise their innovation absorptive capacity. One explanation for this is the importance given to the Technology Readiness Level of projects in regional funding calls. This has led

cluster organisations to focus mainly on companies that are open to technology-intensive projects. There is also little evidence of clusters being used to support early-stage entrepreneurship and start-ups within specific industries.

Why don't cluster organisations provide SMEs and entrepreneurs with adequate support? There are two reasons. First, other organisations within the regional innovation ecosystem, such as the bank foundations, also provide SME and entrepreneurship support. For example, the bank foundations recently collaborated to open a new accelerator for smart mobility (Box 4.5). Second, Piedmont's cluster organisations consider initiatives related to entrepreneurship, start-ups/spin-offs and scale-ups less important than other support measures (OECD, 2020<sup>[12]</sup>). Nevertheless, evidence consistently highlights that cluster policies and initiatives can be effective instruments for organising and delivering SME and entrepreneurship policies thanks to their bottom-up dynamics and ability to exploit synergies with other support services (OECD, 2019<sup>[33]</sup>).

#### Box 4.5. The Piedmont Smart Mobility Accelerator

The Piedmont Smart Mobility Accelerator provides access to a 90-day accelerator programme with personal mentorship, office and meeting space. The programme funds all types of tech-oriented start-ups, working in different industries and using diverse types of business models. Usually, ten companies are chosen per accelerator cycle. The 2021 Program of Techstars Smart Mobility took place in partnership with *Fondazione Compagnia di San Paolo*, *Fondazione CRT* and the Intesa Sanpaolo Innovation Centre. In addition to providing mentoring support, the programme provides each start-up in the accelerator with USD 20 000, which is commonly used as a stipend to support the living expenses of the start-up team. In return, the accelerator receives 6% equity in the company until the company raises a priced equity financing of at least USD 250 000.

Source: <https://www.techstars.com/accelerators/smart-mobility>

Piedmont should continue to make use of clusters to support entrepreneurship. Some cluster organisations are already very active in the promotion of start-ups and in linking innovative and entrepreneurial companies with academia. For example, the Bioindustry Park, which is the managing body of the bioPmed cluster, has been included as a best practice in the EOCIC “Smart Guide to Entrepreneurship Support through Clusters”<sup>4</sup>, published in July 2019. The park functions as a hub between academia and industry. In addition, since 2016 the Environment Park, the managing body of the CLEVER cluster, has organised an annual Climathon. This is a hackathon aimed at generating new entrepreneurial ideas to fight climate change. In 2018, the city of Turin and the Environment Park were chosen by Climate KIC International to host the international Climathon event in addition to the local Climathon. Indeed, the 2019 Turin edition of Climathon<sup>5</sup> was the largest in Europe.

Current activities could be extended to reach out to SMEs with still low innovation capabilities. There are large differences among Piedmont's SMEs in productivity levels. There is also a relatively long tail of low-productivity SMEs at the bottom end of the productivity distribution. Cluster organisations could develop activities to strengthen SME management capabilities, including for example technology adoption and IT engagement, which is often a leading enabler for productivity-enhancing activities in SMEs (OECD, 2017<sup>[34]</sup>). Cluster organisations could also engage in facilitating mentoring activities. Mentoring can be a key tool for supporting the ambition and success of start-ups and scale-ups. Success depends on an expansive pool of mentors, together with support to mentors and entrepreneurs in establishing and operating mentoring relationships. In addition, clusters could better connect start-ups and scale-ups to existing venture capital fund networks in order to acquire external capital, which is currently lacking in the region, and more expertise in technologies and businesses.

As a general rule, cluster organisations often provide business support services for SMEs and entrepreneurship in partnership with different institutions. These are often other cluster organisations, universities, SME or industry associations, technical and vocational schools or the public sector (Lämmer-Gamp, Meier zu Köcker and Köhler, 2016<sup>[35]</sup>). These services are not only provided to support the creation of new business ventures but are delivered as part of a package of services that cluster organisations offer to their members (Table 4.4).

**Table 4.4. Cluster organisation support service for SMEs and entrepreneurship**

| Dimension                              | Conditions supporting entrepreneurship   | Instruments   |
|--|--|---|
| Market conditions                      | <ul style="list-style-type: none"> <li>• Access to domestic markets</li> <li>• Access to foreign markets</li> </ul>  | Distribution of information, networking, matchmaking, legal advisory services for export related activities, international cluster partnerships                         |
| Access to finance                      | <ul style="list-style-type: none"> <li>• Access to public funding</li> <li>• Networking with private investors</li> <li>• Inclusion of financial institutions and venture capitalists</li> </ul>               | Distribution of information, networking and facilitation of contacts with investors, support and advice with submission of project proposals for public grants or loans |
| Knowledge creation and dissemination   | <ul style="list-style-type: none"> <li>• R&amp;D investment</li> <li>• Technological cooperation between firms and other institutions, such as research centres</li> <li>• Technology dissemination</li> </ul> | Project development, facilitation of contacts, matchmaking, support with the acquisition of public funding for innovation   |
| Access to entrepreneurial capabilities | <ul style="list-style-type: none"> <li>• Business and entrepreneurship education</li> <li>• Training and experience of entrepreneurs</li> <li>• Entrepreneurship infrastructure</li> </ul>                     | Training and seminars, co/development of curricula and courses with academic and vocational training institutions, incubators   |

Source: Adapted from (OECD, 2019<sup>[33]</sup>; Lämmer-Gamp, Meier zu Köcker and Köhler, 2016<sup>[35]</sup>).

In addition to providing specific services to entrepreneurs, start-ups, scale-ups and SMEs, cluster organisations can also support entrepreneurship that is focused on new and emerging industries and/or serving environmental or social objectives. In these cases, the support does not target specific individuals or companies, but it benefits the entire cluster by stimulating demand for specific technologies (e.g. green solutions, digitalisation), leading to the development of new markets, supply chains and value chains. The region of Värmland, Sweden, has successfully used industrial clusters to support industrial modernisation, including among SMEs (Box 4.6).

### Box 4.6. Towards a matured cluster ecosystem in Värmland, Sweden

Since the establishment of the cluster strategy “Värmland Model 2.0” in 2012, clusters have played an important role in the success of the regional smart specialisation strategy, facilitating and bridging local industry, including SMEs, and academia. Värmland, situated in North-Middle Sweden, is home to several strong clusters, including the Paper Province Cluster, the Compare Cluster, the Glava Energy Centre, the Steel & Engineering Cluster and Visit Värmland, a cluster linked to tourism. All clusters have a dedicated cluster manager, a team of cluster advisers and strong membership of local companies. The Paper Province cluster emerged out of the need to strengthen the pulp and paper industry after it faced international competition in the 1990s and early 2000s. The Compare cluster emerged as a way to fill a gap in ICT-related competences.

Clusters in Värmland fulfil several important cluster functions: they help fostering networks that enhance knowledge spillovers among actors within the cluster and outside; they represent their members on international markets; and they support the transition to industry 4.0 by identifying future skills and investment needs and actively participating in skills needs assessments.

One example of the success of Värmland's cluster strategy is the development of the bio-economy industry. Traditionally, the region has been dominated by pulp and paper, steel, and engineering. Since the 1990s, the region has experienced an ongoing structural change in the pulp and paper industry due to increased international competition and crises in the sector. Through a cluster approach, the region expanded from the traditional pulp and paper industry into a broader bio-economy model. The Paper Province Cluster became instrumental in bringing together the forest value chain as well as public authorities and Karlstad University to develop a vision for the regional industry. The Paper Province Cluster stressed that both 1) developing a strong vision on where to go with the bio-economy in the next 15 years and 2) active collaboration among stakeholders in the region to reach that goal have been instrumental in accessing funds for the region and driving industrial diversification. The cluster has also been instrumental in developing pragmatic and innovative solutions for local SMEs, for example through close collaboration and shared leadership with the company managers and study visits and exchanges with other clusters in Finland, Norway and Canada.

Source: (OECD, 2020<sup>[26]</sup>)

## Focus area 2: Clusters as drivers of cross-border collaboration and internationalisation

The discussion on strengthening internationalisation through clusters is not new. Some of the most successful clusters have always combined ‘local buzz’ with ‘global pipelines’ (Bathelt, Malmberg and Maskell, 2004<sup>[36]</sup>) and cluster initiatives frequently look beyond their traditional geographic boundaries for new opportunities. However, large-scale cluster policy programmes that simultaneously foster place-based innovation and internationalisation are scarce and their effects and limitations are not well understood yet (Dohse, Fornahl and Vehrke, 2018<sup>[37]</sup>).

In Piedmont, cluster collaboration occurs primarily within the region, leaving room to increase cross-regional and international collaboration. To continue the success of its regional innovation activities, it is crucial for Piedmont to improve its internal and external connections, prioritise complementarities and combine the various strengths of its clusters. To further develop the competitiveness of businesses and innovation, Piedmont should position itself in European and global value chains with the help of clusters. For this purpose, it should improve connections and cooperation with clusters in other regions within Italy



and globally that can connect local businesses with foreign innovation players. This is important for the internationalisation of companies, for attracting foreign partners and financiers to the region and for increasing participation rates in European projects, such as Horizon2020.

Most of Piedmont's clusters have established some international networks. International cross-border cooperation is somewhat limited geographically, taking place primarily with Piedmont's two neighbouring French regions: Auvergne-Rhône Alpes and Provence-Alpes-Côte d'Azur. There is room to further explore cooperation with regions in other neighbouring countries, for example in Switzerland. Piedmont's participation in EUSALP (the European Union Strategy for the Alpine Region) may contribute to expanding these opportunities, particularly given the macro-regional strategy's Thematic Policy Area 1: Economic Growth and Innovation (EUSALP, n.d.<sup>[38]</sup>). At the international level, most regional clusters have established networks related to their respective areas of interest. Some of these networks are informal, some have flourished thanks to the participation in EU-funded projects and others are the result of their membership in formal international cluster networks or associations. All of Piedmont's clusters are members of the European Cluster Collaboration Platform.

### ***Cluster internationalisation helps to increase knowledge heterogeneity in Piedmont's clusters***

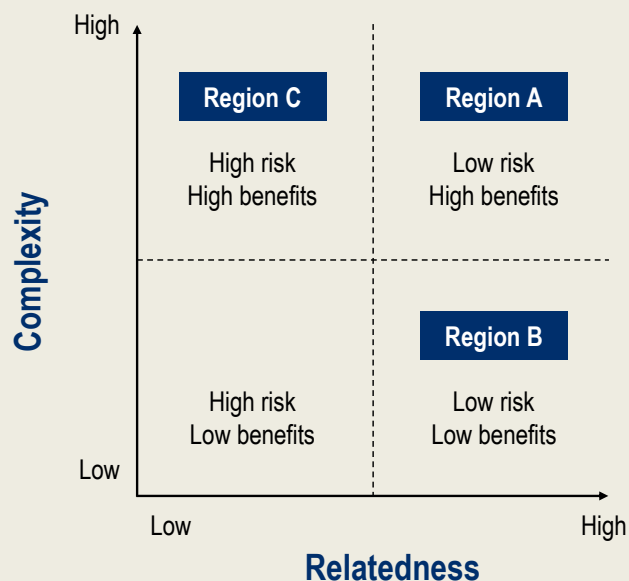
Cross-border collaboration and internationalisation can increase knowledge heterogeneity and introduce new and related economic sectors into a region. This is key in preventing an innovation cluster from slipping from sustainment to decline (Box 3.1). Clusters are well suited to support internationalisation because they can help firms overcome prominent obstacles to internationalisation, such as barriers to market entry, a lack of reliable or suitable business partners abroad, problems managing international activities, and culture and language barriers (Dohse, Fornahl and Vehrke, 2018<sup>[37]</sup>). Cluster organisations can support cluster members develop an internationalisation strategy or to find appropriate business partners. In addition, firms can benefit from cluster reputation effects (Li et al., 2019<sup>[39]</sup>). Small and young firms that often lack financial capacity and foreign experience can significantly benefit from information about foreign markets collected by the cluster organisations. They might also benefit from better access to finance if improved cluster reputation attracts more investors. However, there are other obstacles to internationalisation, such as regulatory barriers to entry for example, that cannot be tackled by clusters alone.

Cross-regional and international collaboration could strongly encourage economic diversification in Piedmont (Box 4.7). Arguably, the diversification of regional economic structures is one of the most important challenges for industrial transition regions (OECD, 2019<sup>[7]</sup>). According to recent academic research, diversification of regional economies through the emergence of new economic activity is more likely to happen with sectors that share a similar technology with sectors that already exist in the region<sup>6</sup>. Through internationalisation efforts, the cluster organisations could open their thematic boundaries to include high value-added technologies, industries or knowledge bases that are related to Piedmont's current specialisations. Such strategies could foster economic diversification (Balland et al., 2018<sup>[40]</sup>).

### Box 4.7. The risks and benefits associated with different diversification strategies

There are different ways in which a region can support economic diversification, with different assumptions on what the benefits of diversification are and how cross-regional and international collaboration can contribute. Should a region pursue an incremental economic diversification strategy or strive towards radical diversification into sectors with no related knowledge? Unfortunately, no simple answer exists. The challenges to diversification are well illustrated in Figure 4.5.

Figure 4.5. The complexity/relatedness matrix



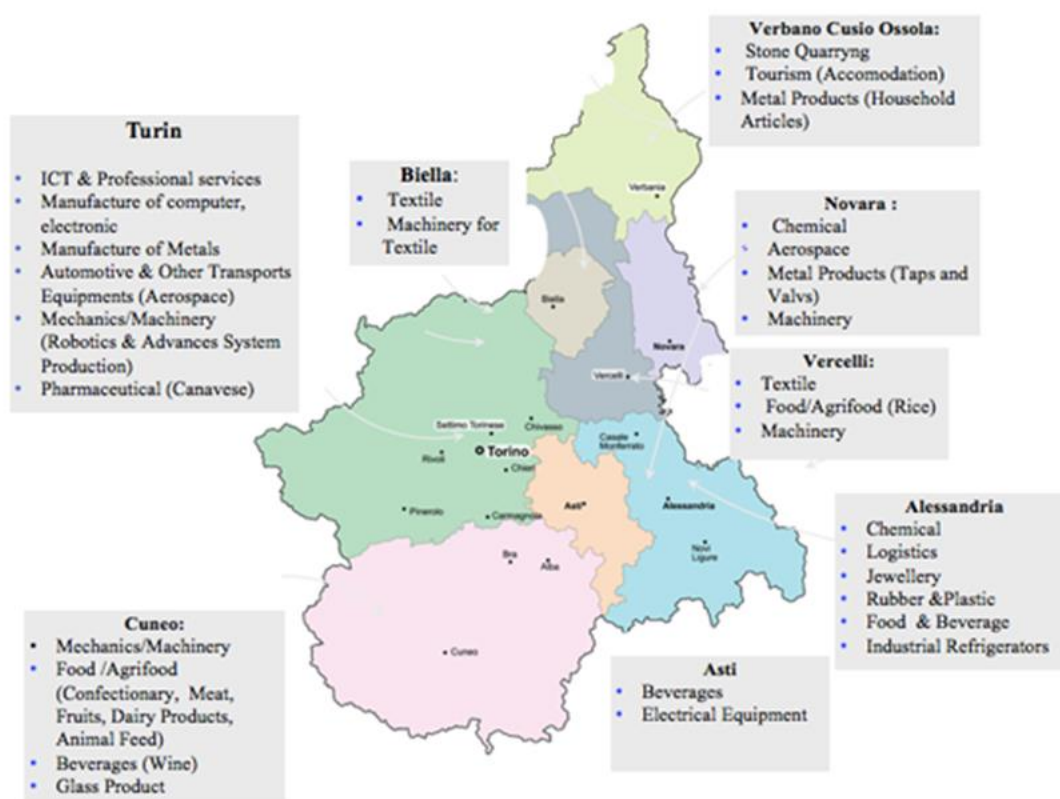
Source: (Marques, 2021<sup>[25]</sup>)

Regions can pursue different types of economic diversification strategies. Such strategies can be either low or high in technological relatedness to current regional activities, as shown on the horizontal axis, and low or high in technological complexity, as displayed on the vertical axes. A low-risk/high-benefits situation (region A) occurs if a region invests in or attracts a complex economic sector that is also highly related to current strengths. A region that is investing in highly-related but low-complexity sectors (region B) would have a low-risk/low-benefits strategy, since the new sector would add little to the current context in terms of opportunities for innovation and productivity growth. On the other hand, a region attracting high-complexity economic activities that are not related to current economic structure (region C) would have a high-risk/high-benefit strategy, which could potentially pay off in terms of changing the growth path of a territory. But it would also involve a high level of risk-taking, which may be difficult for policy makers to accept. At the same time, relying too much on related economic structures may result in too many incremental innovations with rather limited economic potential in the long term. Hence, in order to create a long-lasting competitive advantage, more radical innovations may be necessary, too.

Sources: (Balland et al., 2018<sup>[40]</sup>) (Marques, 2021<sup>[25]</sup>)

Piedmont's cluster organisations could enhance their contribution to economic diversification within the region and through internationalisation efforts. This in turn could help upgrade Piedmont's economic sectors, particularly those that are medium- and low-tech (e.g. agri-food or textiles). Piedmont's industry is primarily located in the area surrounding the city of Turin. Smaller industrial specialisations exist throughout the territory, such as agriculture and agri-food in Cuneo, textiles in Biella, water taps, valves and other machinery in Novara, and viticulture machinery and equipment in Asti and Alessandria (Figure 4.6). One way to accomplish this diversification and internationalisation is for the cluster organisations to open their thematic boundaries and add related technologies, industries or knowledge bases from inside the region of Piedmont. This is already happening in some industries. For example the environmental industries in Piedmont are associated with companies from several industries, such as chemistry, agriculture and renewable energies, that work jointly on innovations in the field of pollution management and cleaner technologies for farming (OECD, 2020<sup>[12]</sup>). Another option is to include knowledge from the thematic field of the innovation cluster but from different locations. This includes going international. Doing so could foster more complex and more innovative economic activities and could potentially reverse declining productivity growth over the past 10 years.

**Figure 4.6. Productive specialisations in Piedmont**



Source: (IRES Piemonte, 2021<sup>[41]</sup>; OECD, 2020<sup>[42]</sup>)

When assessing whether focusing on cluster internationalisation efforts on a specific sector would be valuable, Piedmont should make sure that the sector is related to its current specialisations, and that it is a sector with high value-added, such as advanced manufacturing. This ensures that internationalisation efforts provide additional opportunities for innovation and productivity growth. The Cluster Partnership for Photonics for Advanced Manufacturing (PIMAP) has identified a series of success factors in internationalisation strategies, which might help Piedmont in its internationalisation efforts (Box 4.8).

#### **Box 4.8. Lessons learned from the Cluster Partnership for Photonics for Advanced Manufacturing**

##### ***Good practices on cross-sectoral cooperation and internationalisation***

The Cluster Partnership for Photonics for Advanced Manufacturing (PIMAP) is led by four European clusters to support the adoption of photonics and microwave technologies for the development of advanced manufacturing and related industrial applications. The project provides a springboard for European cluster SMEs to internationalise towards the US and Canada. It is funded by the European Commission under the project call named “Cluster Go International”, aiming at strengthening cross-sectoral cooperation and internationalisation of clusters and their members, especially SMEs.

The PIMAP partnership has identified a series of success factors and developed recommendations for collaboration with international markets and maximising its impact for SMEs:

- **Identify common market interests:** Exploring the grounds for cooperation is essential prior to entering international markets. It is essential to have a good knowledge of each partner needs and expectations. The PIMAP Partnership conducted an analysis of market trends and opportunities in the US and Canada to identify the main global trends and opportunities, major sector industrial associations and information regarding international trade.
- **Develop a common approach towards international markets and explore the needs of SMEs:** The development of a common approach towards international markets in alignment with SME needs creates a critical mass and facilitates their access to international markets.
- **Engage with international stakeholders:** Connections with stakeholders based in the own country such as Chambers of Commerce and accelerators facilitate market penetration.
- **Define Key Performance Indicators to monitor the results:** Key Performance Indicators (KPIs) measure the benefits of international activities by the clusters and its SMEs. KPIs from the PIMAP Partnership include (i) international third-country visits conducted by cluster managers to test the PIMAP concept and value chain; (ii) exchanging experience with cluster managers and Cluster Go International projects; (iii) participating in international matchmaking events; (iv) organising workshops, and (v) engaging with business networks and regional development agencies.

Source: (PIMAP Partnership, 2019<sup>[43]</sup>)

#### ***Improved cluster collaboration and internationalisation requires several policy actions***

Supporting greater internationalisation among Piedmont’s clusters can generate greater knowledge exchange and encourage economic diversification in the region. The following actions are suggested to enhance cluster internationalisation in Piedmont:

### *Developing a cluster internationalisation strategy for Piedmont*

It seems that some cluster organisations in Piedmont provide internationalisation activities to participating firms and research institutions, yet the region lacks a strategic approach to overall cluster internationalisation. A written and integrated internationalisation strategy would help ensure consistency in internationalisation efforts of clusters in space and over time and ensure broad support among all participants in the clusters. It could also help identify opportunities for cross-sector collaboration and closely align the regional internationalisation activities pursued by the regional internationalisation agency CEIP with cluster internationalisation activities. Such an approach would first require understanding the regional need for internationalisation. It is especially important to get this first phase right, so as to ensure 'buy in' among cluster members. It is also important to be clear about which countries and markets the clusters wish to target. Regional clusters should undertake a joint analysis of market trends and internationalisation opportunities in a coordinated fashion. This is currently not done in Piedmont (OECD, 2020<sup>[12]</sup>), but would help build synergies between clusters and explore foreign market opportunities that combine business activities from several clusters. Second, clusters also need to have access to the right competences and resources to be able to work internationally. Finally, the international work must be financed, which is something to address early in the strategy's planning. As part of the strategy, an action plan and clear milestones should be drawn up for all international activities. Finally, the momentum can be kept by maintaining and developing international networks and services. The Flemish Cluster Network, as well as the international agency of Baden-Württemberg in Germany provide examples of how regional innovation actors can support the development of cluster internationalisation efforts (Box 4.9).

#### **Box 4.9. Examples of internationalisation support through clusters**

##### **The Flemish Cluster Network, Belgium**

The Flemish cluster policy distinguishes two types of clusters: innovative business networks and spearhead clusters. Innovative business networks (IBNs) are populated by intensively collaborative organisations building innovation networks. The networks are expected to implement concrete action plans with a visible economic added value for each of the participating organisations. IBNs are typically small-scale initiatives with a support period of three years. This cluster type also includes mutual initiatives in emerging industries such as creative and digital industries. Spearhead clusters differ from IBNs in terms of scale, maturity, time horizon and ambition level. They are typically large-scale, ambitious and can receive up to 10 years of funding. They must be active in a domain that is of strategic importance to Flanders, which limits their number. Currently, there are six. The Flemish Innovation & Entrepreneurship Agency supports both types of clusters in their internationalisation efforts.

##### **Baden-Wuerttemberg international, Germany**

In Baden-Wuerttemberg, the regional internationalisation agency bw-I (Baden-Wuerttemberg international) provides different financial and advisory tools to support the internationalisation activities of regional clusters and networks. One of them is the possibility to obtain funding for the development of internationalisation strategies. These strategies define target markets and cluster-specific measures with a view to opening up to foreign markets. The agency also advises clusters on their strategies and helps find synergies between individual cluster strategies.

Source: (Baden-Wuerttemberg, 2021<sup>[44]</sup>) (Clustercollaboration, 2021<sup>[45]</sup>), (InvestinFlanders, 2021<sup>[46]</sup>)

### *Participation in international projects and cluster exchanges*

Through participation in international projects, cluster organisations and their members can find suitable partners and build trustworthy relationships, upon which further cooperation may be developed. While cluster organisations in Piedmont are supporting internationalisation activities, their breadth, scope, and coverage is not always clear. All regional clusters have developed some networks with international partners. Some cluster organisations are very active in using European and international platforms. Others, not so much (OECD, 2020<sup>[12]</sup>). Using the smart specialisation strategy (S3) thematic platforms created by the Joint Research Centre in Seville (Box 4.10) would allow Piedmont to coordinate with other European regions with similar industrial structures and apply for funding that would cover European-wide value chains. The S3 thematic platforms provide an interactive and participatory environment supporting inter-regional cooperation in smart specialisation in areas that are among Piedmont's regional strengths (e.g. agri-food and energy). Better cross-regional cooperation through smart specialisation could support internationalisation efforts by local firms. It could also push SMEs to work together to ensure that the value-added generated in value chains is more evenly distributed, and avoid arms-length behaviour from multinationals.

#### **Box 4.10. S3 thematic platforms**

Starting in 2015, the European Commission launched three thematic S3 platforms – in Agri-Food, Energy and Industrial Modernisation. The platforms offer participating clusters an opportunity to exploit synergies across partnerships and across sectors. Together, partner regions analyse and tackle various obstacles related to the implementation of their smart specialisation strategies. Thematic partnerships help regions to improve their regional knowledge base, leading to new paths of development and a better position in global value chains and to transnational joint innovation strategies.

Source: (European Commission, 2021<sup>[47]</sup>)

### *Ensuring knowledge spillovers to local businesses not directly involved in internationalisation efforts*

Piedmont's cluster organisations could further enable knowledge diffusion from firms participating in internationalisation activities to those that only conduct business domestically. Most firms that internationalise are usually already involved in funded R&D projects or have the capacity to access foreign markets. To make sure that internationalisation benefits also spill over to cluster members that are not directly involved in internationalisation activities – and to the economic cluster more broadly – cluster organisations could better prioritise the region-wide diffusion of contacts, knowledge, and good practices that facilitate internationalisation. Two important aspects need to be strengthened in Piedmont to influence knowledge diffusion. First, the possibility for intensive learning processes must be present in each cluster. These are strongly affected by the degree of social capital and by the direct and indirect links among cluster actors (Bathelt, 2001<sup>[5]</sup>). For example, such links can be established or strengthened through workshops and knowledge sharing events offered by cluster management organisations. Second, firms learn especially well from other actors that are comparable, i.e. in the same sector, with similar technological backgrounds, production processes, or similar in size or age. Cluster management organisations in Piedmont could use this "role model effect" to increase the likelihood that knowledge and information are incorporated by many firms. Several concrete practices can help knowledge diffusion (Box 4.11).

### Box 4.11. Making use of knowledge-brokering practices to support SMEs in French clusters

Studying three French competitiveness clusters (Advancity, Axelera and Imaginove) based in the Ile-de-France and Auvergne-Rhône-Alpes regions, a recent analysis shows that innovation clusters can develop concrete practices to support knowledge exchange and foster open and collaborative innovation in clusters.

To facilitate access to knowledge by all cluster members, and especially SMEs, and to lay the foundation for knowledge sharing within and across regional clusters, the researchers observed several common practices implemented by the cluster governance in all three clusters:

- Monthly or bi-monthly meetings with a core group of 6-15 cluster members within a cluster to share experiences and identify new applications of technology.
- The creation of a collective identity at the cluster level to build cohesion between its members.
- The organisation of “speed meetings” between different cluster members to facilitate reciprocal discoveries and exchange.

Other networking devices followed, such as the Axelera Business Club, a club for SMEs to help them exchange good practices and develop business networks with larger firms, and the participation in professional fairs under a common banner to facilitate the access to external knowledge. Finally, the clusters also created collaborative innovation platforms as a tool to facilitate cross-fertilisation between industries. These platforms are physical spaces where tools, machines and resources are shared to facilitate the experimentation and the concrete implementation of the results of collaborative innovation projects.

Source: (Castro Gonçalves, Mitkova and Berthinier-Poncet, 2017<sup>[48]</sup>)

#### *Opening up local clusters to outside actors*

Broadening cluster participation beyond the triple helix model can help Piedmont's clusters finance internationalisation activities. Even though, as stated earlier, the engagement between the cluster management organisations in Piedmont and academia can be improved, in general terms, both work with the triple helix model and emphasise the involvement of public and private actors plus academia in knowledge exchange and collaboration. However, the triple helix can become too restrictive. Two additional groups of partners will make cluster development much more effective, especially for internationalisation. These groups are the third sector and financial investors, including venture capital, business angels, banks, etc. At the various stages of cluster internationalisation, different levels of financing will be required that will need to come from a variety of sources. Including foreign firms, entrepreneurs from other fields (in particular ICT) and private risk capital could help Piedmont's clusters internationalise while also leveraging the necessary financing for local business innovation, including specific activities related to start-up acceleration and growth (OECD, 2020<sup>[12]</sup>).

#### *Aligning internationalisation activities between the clusters and the foreign direct investment agency*

Cluster internationalisation is an important tool for attracting foreign firms or investors. OECD experience has shown that regional foreign direct investment (FDI) strategies and cluster internationalisation strategies are not always well aligned (OECD, 2020<sup>[8]</sup>). This is particularly true if cluster management organisations target internationalisation activities to specific sectors or technologies, while FDI agencies have either



different or ill-defined priorities. At the same time, cluster internationalisation can help build FDI if the cluster develops an international reputation that attracts foreign investors (Andersson, Evers and Griot, 2013<sup>[49]</sup>). There seem to be some cooperation between the regional FDI agency *Centro Estero Internazionalizzazione Piemonte* (CEIP) and the clusters in Piedmont, but it takes place mostly on an *ad hoc* basis. It would be important for changes in cluster policy to ensure that any planned cluster internationalisation strategy aligns well with the strategic priorities of the regional FDI agency, and, ideally, vice versa.

### Focus area 3: Clusters as providers of strategic intelligence for the region

Cluster organisations in Piedmont should serve their member companies, and support regional policy makers with strategic policy and sector intelligence. Some innovation clusters in Piedmont seem to be on top of technological and market developments in their thematic field. Yet, there is room to improve the ability of others in the use of strategic foresight tools and to develop technology roadmaps that help design regional innovation policy objectives. Cluster organisations can provide important guidance to local and regional policy makers and other stakeholders for developing future-proof innovation policies in important strategic areas, such as fostering the digital transformation and the transition to a net-zero carbon economy (Derlukiewicz et al., 2020<sup>[50]</sup>). Furthermore, based on their close collaboration with leading private industry firms, cluster organisations can help generate strategic intelligence for longer-term market and technological developments, which can and should inform the design of regional development and innovation policies (Dohse, Fornahl and Vehrke, 2018<sup>[37]</sup>). Cluster organisations and the regional policy makers in Piedmont should work together to design and implement foresight and technology assessment processes and roadmaps. They can provide decisive tools for strategic knowledge generation and transfer into new products and services and advance the regional agenda to use innovation and innovation policy for public missions.

#### ***Developing and implementing strategic foresight and technology roadmaps through clusters***

One way for cluster organisations to support regional development is to develop technological and industrial roadmaps and strengthen foresight capacities. Such roadmaps should illustrate how Piedmont's industries can contribute to a green and digital transition and support broader regional development objectives. Such roadmaps can be developed with a set of foresight techniques that clusters in Piedmont do not yet use (OECD, 2020<sup>[12]</sup>). Foresight is about bringing together the key stakeholders of a region, or cluster, in order to think about the economic future and take the action that may be required (OECD, 2020<sup>[51]</sup>). It is a useful public private partnership economic development tool not least because it helps build trust and confidence among stakeholders. A key objective of foresight is to ensure that all relevant stakeholders have ownership of the strategy development process and a common understanding of problems and solutions. A range of formal techniques, from horizon scanning and megatrend analysis, to identifying a number of different plausible future scenarios, can be used for foresight analysis (Box 4.12).

#### Box 4.12. Strategic foresight methods for regional innovation policy

- **Horizon scanning:** seeking and researching signals of change in the present and their potential future impacts. Horizon scanning is the foundation of any strategic foresight process. It can involve desk research, expert surveys, and review of existing literature.
- **Megatrend analysis:** exploring and reviewing large-scale changes at the intersection of multiple policy domains, with complex and multidimensional impacts in the future.
- **Scenario planning:** developing multiple stories or images of how the future could look in order to explore and learn from them in terms of implications for the present.
- **Visioning and back-casting:** developing an image of an ideal (or undesirable) future state, and working backwards to identify what steps to take (or avoid).

Source: (Hynes, Lees and Müller, 2020<sup>[52]</sup>)

Piedmont's regional clusters can make use of foresight analysis through technological roadmaps. In a cluster perspective, road mapping is similar to foresight although it clearly focuses on the implementation steps needed to get from A to B (Piirainen, Tanner and Alkærsg, 2017<sup>[53]</sup>). The first stage of road mapping is to identify the objectives. Is the objective to identify a completely new product? Or to improve aspects of an existing product? Or is it to switch from one type of technology to another? The second stage is to use strategic foresight tools (Box 4.12) to identify new areas of science, emerging technologies, and changes in markets – these are the parameters that help inform strategic choices. These two stages are not necessarily chronological and will clearly interact. The third stage is to determine how the objectives can be attained. The outcome of a road mapping exercise will be a schematic illustration of project actions, milestones and timelines. It will identify the new product, as well as those technologies needed to produce it. The action plan will show how those technologies can be created or acquired. Roadmaps can be created by a relatively small group of experts (from science, industry and end-users) but in a cluster perspective it is a good idea to involve all main cluster stakeholders in the process (Gheorghiu, Andreescu and Curaj, 2015<sup>[54]</sup>).

Foresight exercises are suitable and feasible only when clusters already have some experience working together, and when firms in the cluster are not in direct competition. It is often at the interface of different clusters that many innovation opportunities may be found, which means that cross-cluster collaboration in developing technology roadmaps based on foresight exercises is important (OECD, 2019<sup>[7]</sup>). Therefore, in a first step, Piedmont should benchmark current foresight activities in its existing clusters to understand how the tools described above are already used and by whom, and explore interests in collaborating among clusters. These questions can be answered using a semi-structured questionnaire or interviews. Following this step, a series of moderated workshops should be organised by the Piedmont regional authorities and cluster management organisations to compare and contrast stakeholder views about the future with the most up-to-date research on real trends. This approach stimulates debate amongst stakeholders. The aim of the workshops is to achieve a consensus position on action priorities and to identify areas for collaborative actions by each cluster. The foresight exercise conducted by the region of East and North Finland (Box 4.13) is an example of how examining skill needs helps re-skill workers, enabling them to participate in the changing economy.

### Box 4.13. Regional foresight in East and North Finland

In east and north Finland, regional foresight coordination is a statutory responsibility of regional councils, and duties related to it are set out in the Act on Regional Development (1651/2009). The objective of the regional exercises is to monitor the regional operating environment, and identify changes in industry sectors, as well as in the needs of the labour force and its existing skills and expertise. Region-specific operational foresight platforms guide the foresight work in each region.

A key success factor of regional foresight work in Finland is cooperation among different relevant actors in order to create a shared understanding of future challenges and opportunities in the region, as well as a shared vision around future development objectives and the necessary means to reach set targets. Each region has launched place-specific regional foresight models and produced local analysis reports that feed into the support of regional policy strategies and programmes.

Source: (OECD, 2019<sup>[7]</sup>)

Two difficulties need to be kept in mind when thinking about foresight and technology roadmaps. First, future events and trends or technological progress are very hard to predict with any degree of accuracy. This means road mapping must continuously use the best current strategic intelligence available and remain open, flexible and constantly under review. Second, even the best policy planning cannot foresee all possible eventualities and a range of policy related problems can occur, the COVID-19 pandemic, for example. This is why it is important to build consensus on the future development path of regional industries before introducing a new policy initiative.

### ***Using clusters to support social and environmental innovation practices in Piedmont***

Clusters can be important contributors to meeting sustainable development aims. According to the academic literature, clusters can contribute to sustainable development by developing new and sustainable technologies for emerging industries, creating new business activities, raising sustainability issues with major technology companies, and connecting local firms to sustainable value systems (Derlukiewicz et al., 2020<sup>[50]</sup>). In addition, clusters can participate actively in sustainable development as they promote knowledge creation, joint learning, technology transfer, as well as collaboration, and sustainable innovations. Finally, clusters can facilitate the sustainable upgrading of small and medium-sized enterprises and encourage the participation of stakeholders in the process of sustainable development (Li et al., 2019<sup>[39]</sup>).

Piedmont is ambitious in achieving sustainable regional development, and some clusters already have a strong focus on sustainability practices. The Piedmont Regional Strategy for Sustainable Development provides the overall strategic direction and operational roadmaps to achieve the sustainability objectives of the 2030 Agenda and the National Strategy for Sustainable Development. Already in the current cluster policy, cluster organisations in Piedmont play an important role in delivering regional sustainability policy objectives. For example, several cluster organisations are actively supporting the regional environmental and energy transition. The green chemistry and advanced material cluster aims to advance green energy and energy efficiency, while the agri-food cluster supports advanced packaging and environmental-friendly food processing and manufacturing.

Cluster organisations in Piedmont could go further to support sustainable business models. Cluster organisations could promote greater cooperation in sustainable development areas (e.g. smart mobility or the circular economy) that depend on input from diverse industries. They could also actively engage the third sector in this effort. Solving societal challenges requires connecting different and often disparate

sectors and types of actors. For example, addressing traffic congestion issues in city centres needs to take into account local solutions that address mobility, tourism, retail, logistics, etc. (OECD, 2020<sup>[55]</sup>). Clusters can serve as living laboratories and demonstrators of new solutions and innovations. Piedmont's clusters could more clearly emphasise sustainable technologies in future technology roadmaps. They could also conduct targeted workshops that help identify how individual regional clusters can further contribute to strategic sustainable development objectives and develop concrete action plans. Piedmont's cluster organisations should also regularly provide information and support to their member firms to adopt new sustainable business practices and models. This could be done directly or with the support of the third sector, for example in a workshop format. The region of northern Denmark provides an example of how local innovation clusters can facilitate the transition to sustainable business models (Box 4.14). This Danish experience could be adapted to the Piedmont region to promote greater integration among its innovation clusters. Clusters in Piedmont could jointly identify companies interested in going circular and develop new business models and business opportunities across traditional cluster boundaries.

#### **Box 4.14. Using smart specialisation clusters to facilitate the circular economy transition for local companies in northern Denmark**

The Northern Denmark S3 focuses on reinforced local partnerships to achieve innovation-based development. In line with this approach, between 2017 and 2020 the industrial area of Aalborg in northern Denmark developed a local partnership to support the circular economy in and around the Port of Aalborg. The initiative brought together different stakeholders in the region, including SMEs in the port's industrial area, the University of Aalborg and local public authorities. As a result, 42 circular business models were developed involving 25 companies located in the same area, with a cluster facilitator's help.

Together, these new business relationships led to significant decreases in energy consumption, material use and greenhouse gas emissions. At the same time, they brought substantial economic benefits thanks to product innovation and savings from the use of waste as a resource, as well as radically changing the thinking of many SME managers. A new 'sustainable business development tool' – the GAIA tool – was developed to help companies change their business model

Source: (Smart Specialisation Platform, 2020<sup>[56]</sup>)

## **Conclusion and recommendations**

Piedmont has a long tradition of innovative economic clusters, which can be leveraged to support industrial transformation and economic modernisation. The region's innovation cluster organisations support a significant number of (primarily) mid-sized firms in joining R&D networks of local large firms and international firms. They also lead a variety of networking initiatives, such as organising trade fairs. Yet, clusters could contribute even more to innovation in Piedmont by rapidly adapting to current and upcoming challenges and new realities. Stagnating membership among cluster organisations and a focus on already innovative companies risks a decline in cluster performance in Piedmont. To counter this, and to support the region's long-term development, clusters and cluster organisations should continue to play a key role in industrial transition and support companies through this process. This chapter argues that the current cluster policy needs revision to better integrate the themes of entrepreneurship, digital transformation, innovation diffusion, and up- and re-skilling in cluster activities. It further argues that such a revision should be based on three core focus areas: supporting clusters as drivers of the innovation ecosystem; supporting internationalisation; and ensuring that clusters have the capacity and means to contribute to regional

development needs and objectives. Capacity to implement and act within a revised cluster policy and model is as important as the revision itself. This includes designing incentives for clusters to cooperate and offer joint services, and to ensure access to the expertise, skills and insights necessary to support innovation among frontrunners and innovation diffusion among lagging companies.

It is recommended that Piedmont use the next iteration of its cluster policy and cluster model to upgrade the role and capacity of its clusters as central innovation actors. By doing so it will help its firms respond to changing industry needs and developments and more easily contribute to regional innovation and development objectives. A revised cluster policy should ensure that entrepreneurship, digital transformation, innovation diffusion, and up- and re-skilling are well integrated into cluster programmes.

## Recommendations for action to develop a stronger cluster policy and model in Piedmont

It is recommended that Piedmont use the next iteration of its cluster policy and cluster model to upgrade the role and capacity of its clusters as central innovation actors, in this way helping its firms respond to changing industry needs and, and more easily contribute to regional innovation and development objectives. A revised cluster policy should ensure that entrepreneurship, digital transformation, innovation diffusion, and up- and re-skilling are well integrated into cluster programmes.

### 1. Maintain clusters in the sustainment stage of the cluster life-cycle model:

- Encourage stronger engagement between cluster organisations and other innovation stakeholders in the region, including small and micro enterprises, SMEs, universities and other education institutes.
- Reinforce the importance of an expanded definition of innovation, beyond technology and R&D, and proactively supporting this broader perspective, for example through specific project calls.
- Ensure that the activities and support offered by cluster organisations match the needs, interests and capacity of small and micro firms so they can grow internal innovation capabilities.
- Foster the development of projects, and their management by cluster organisations that extend beyond the scope of cluster organisation activity.
- Facilitate access to funding for start-ups, for example by launching a set of project calls targeting this type of firm.

### 2. Reinforce clusters as drivers of the regional innovation ecosystem:

- Strengthen collaboration among cluster organisations, for example by:
  - Introducing a cluster management platform to share information and good practices, and promote knowledge exchange/knowledge spillovers within a cluster and across cluster organisations.
  - Supporting joint cluster activities such as training sessions to address challenges, concerns or issues common to clusters and cluster management.
- Reinforce interaction and exchange among the cluster organisations, universities and other knowledge institutions (e.g. ITS), for example by:
  - Encouraging the co-creation of education material and curricula to match industry needs, and expanding student placement schemes.
  - Building dialogue opportunities between clusters and universities, for example through networking events, joint seminars, roundtables or workshops on progress in achieving the region's innovation policy objectives, new technologies, regional innovation needs, etc.
- Use clusters and cluster organisations to support skills for industry, including by:

- Applying the triple helix approach to identify and address skills imbalances, build skill sets that meet regional or sectoral innovation and industry trends, and disseminate information on funding programmes and training initiatives.
- Encouraging cluster members to collaborate with the ITS to upgrade specific skills among their staff to better accommodate changing technological and industry realities. Empower ITS to add this type of learning into its curricula.
- Ensure that cluster organisations continuously support SMEs and entrepreneurship, including by:
  - Assisting cluster organisations improve their outreach to SMEs with low innovation capabilities,
  - Generating opportunities for mentoring and developing more robust business support services.
  - Promoting cluster organisations as a channel to better link start-ups and scale-ups with existing venture capital fund networks.
  - Increasing the capacity of cluster organisations to support entrepreneurs focused on new and emerging industries, or those targeting an activity with environmental or social objectives.

### **3. Engage clusters as drivers of cross-border collaboration and internationalisation**

- Encourage cluster organisations to open thematic boundaries, for example by supporting smaller industrial specialisations, and/or add related technologies and industries or knowledge bases already within the region.
- Develop a cluster internationalisation strategy or support cluster organisations to work together to develop one for Piedmont's innovation ecosystem.
- Increase participation in cross-border (inter-regional) and/or international projects by promoting cluster exchange, including via S3 thematic platforms.
- Prioritise region-wide diffusion of knowledge, contacts and good practices that will facilitate internationalisation throughout the innovation ecosystem. Consider using knowledge-brokering practices to support this.
- Expand past a triple helix model, proactively incorporating the third sector and financial investors into innovation activities.
- Reinforce the dialogue and partnership opportunities between CEIP, innovation stakeholders and cluster organisations.

### **4. Promote clusters as strategic intelligence hubs for the region**

- Develop strategic capacity among cluster organisations (e.g. in horizon-scanning and foresight exercises), and partner with them to build strategic insights into future industry developments and innovation vision-setting for the region.
- Build cluster organisation capacity to design technological and industrial roadmaps highlighting how innovation actors can contribute to broader societal challenges (e.g. the green and digital transitions) and use them as a means to reinforce regional innovation.
- Create opportunities and incentives for clusters to contribute to larger-scale national and international development goals (e.g. the Sustainable Development Goals, recovery and resilience, a just transition, the international climate agenda, etc.).



## References

- Andersson, S., N. Evers and C. Griot (2013), “Entrepreneurship & Regional Development An International Journal Local and international networks in small firm internationalization: cases from the Rhône-Alpes medical technology regional cluster Local and international networks in small firm internationalization: cases from the Rhône-Alpes medical technology regional cluster”, *Entrepreneurship & Regional Development*, Vol. 25, <http://dx.doi.org/10.1080/08985626.2013.847975>. [15]
- Andersson, S., N. Evers and C. Griot (2013), “Local and international networks in small firm internationalization: Cases from the Rhône-Alpes medical technology regional cluster”, *Entrepreneurship and Regional Development*, Vol. 25/9-10, pp. 867-888, <http://dx.doi.org/10.1080/08985626.2013.847975>. [49]
- Audretsch, D. and M. Feldman (1996), “Innovative clusters and the industry life cycle”, *Review of Industrial Organization*, Vol. 11/2, pp. 253-273, <http://dx.doi.org/10.1007/BF00157670>. [2]
- Baden-Wuerttemberg (2021), *Baden-Wuerttemberg*, <https://www.bw-i.de/>. [44]
- Balland, P. and R. Boschma (2021), “Complementary interregional linkages and Smart Specialisation: an empirical study on European regions”, *Regional Studies*, Vol. 55/6, pp. 1059-1070, <http://dx.doi.org/10.1080/00343404.2020.1861240>. [57]
- Balland, P. et al. (2018), “Smart specialization policy in the European Union: relatedness, knowledge complexity and regional diversification”, *Regional Studies*, Vol. 53/9, pp. 1252-1268, <http://dx.doi.org/10.1080/00343404.2018.1437900>. [40]
- Bathelt, H. (2001), “Regional competence and economic recovery: Divergent growth paths in Boston’s high technology economy”, *Entrepreneurship and Regional Development*, Vol. 13/4, pp. 287-314, <http://dx.doi.org/10.1080/08985620110067502>. [5]
- Bathelt, H., A. Malmberg and P. Maskell (2004), “Clusters and knowledge: local buzz, global pipelines and the process of knowledge creation”, *Progress in Human Geography*, Vol. 28/1, pp. 31-56, <http://dx.doi.org/10.1191/0309132504ph469oa>. [36]
- Boschma, R. et al. (2009), “Technological relatedness and regional branching Dynamic Geographies of Knowledge Creation and Innovation”, [http://dimetic.dime-eu.org/dimetic\\_files/artbookBatheltFeldmanKogler.pdf](http://dimetic.dime-eu.org/dimetic_files/artbookBatheltFeldmanKogler.pdf) (accessed on 6 May 2018). [17]
- Brainport Eindhoven (2020), *Brainport Eindhoven. Europe’s top technology region*, [https://brainporteindhoven.com/fileadmin/user\\_upload/Campussen/Campuses\\_in\\_Brainport\\_Eindhoven\\_brochure\\_november\\_2020.pdf](https://brainporteindhoven.com/fileadmin/user_upload/Campussen/Campuses_in_Brainport_Eindhoven_brochure_november_2020.pdf). [29]
- Castro Gonçalves, L., L. Mitkova and A. Berthinier-Poncet (2017), “Knowledge Management: a Lever for Cluster Governance in Dynamizing SME’s Open Innovation”, XXVIe Conférence Internationale de Management, <https://www.strategie-aims.com/events/conferences/28-xxvieme-conference-de-l-aims/communications/4743-knowledge-management-a-lever-for-cluster-governance-in-dynamizing-smes-open-innovation/download> (accessed on 1 April 2021). [48]
- Clustercollaboration (2021), *The Flemish Cluster Model*, <https://clustercollaboration.eu/content/flemish-cluster-network>. [45]



- Content, J. and K. Frenken (2016), “Related variety and economic development: a literature review”, *European Planning Studies*, Vol. 24/12, pp. 2097-2112, <http://dx.doi.org/10.1080/09654313.2016.1246517>. [16]
- Delgado, M., M. Porter and S. Stern (2014), “Clusters, convergence, and economic performance”, *Research Policy*, Vol. 43/10, pp. 1785-1799, <http://dx.doi.org/10.1016/j.respol.2014.05.007>. [3]
- Derlukiewicz, N. et al. (2020), “How do Clusters Foster Sustainable Development? An Analysis of EU Policies”, *Sustainability*, Vol. 12/4, p. 1297, <http://dx.doi.org/10.3390/su12041297>. [50]
- Dohse, D., D. Fornahl and J. Vehrke (2018), “Fostering place-based innovation and internationalization – the new turn in German technology policy”, *European Planning Studies*, Vol. 26/6, pp. 1137-1159, <http://dx.doi.org/10.1080/09654313.2018.1458285>. [37]
- EOCIC (2018), *Regional Assessment report - Piedmont. EASE/COSME/2016/035*. [13]
- European Commission (2021), *Thematic Platforms - Smart Specialisation Platform*, <https://s3platform.jrc.ec.europa.eu/thematic-platforms> (accessed on 1 April 2021). [47]
- European Union (2021), *Cluster Definitions*, <https://clustercollaboration.eu/cluster-definitions>. [1]
- European Union (2019), *Summary Report on lessons learnt from fostering modern Cluster Policy in regions in industrial transition*. [28]
- EUSALP (n.d.), *The Objectives*, <http://dx.doi.org/www.alpine-region.eu>. [38]
- Frenken, K., F. Van Oort and T. Verburg (2007), “Related Variety, Unrelated Variety and Regional Economic Growth”, *Regional Studies*, NULL, pp. 685-697, <http://dx.doi.org/10.1080/00343400601120296>. [24]
- Gheorghiu, R., L. Andreescu and A. Curaj (2015), “A foresight toolkit for smart specialization and entrepreneurial discovery”, *Futures*, <http://dx.doi.org/10.1016/j.futures.2016.04.001>. [54]
- Grillitsch and Markus (2018), “Place-based entrepreneurship and innovation policy for industrial diversification”, *Papers in Innovation Studies*, [https://ideas.repec.org/p/hhs/lucirc/2018\\_003.html](https://ideas.repec.org/p/hhs/lucirc/2018_003.html) (accessed on 19 June 2018). [18]
- Hynes, W., M. Lees and J. Müller (eds.) (2020), *Systemic Thinking for Policy Making*, OECD, <http://dx.doi.org/10.1787/879c4f7a-en>. [52]
- InvestinFlanders (2021), *InvestinFlanders*, <https://www.flandersinvestmentandtrade.com/invest/en/investing-in-flanders/flanders%E2%80%99-innovative-cluster-policy-your-service>. [46]
- IRES Piemonte (2021), *Relazione Annuale 2021*, <https://www.ires.piemonte.it/relazione2021/RelazioneAnnuale2021.pdf>. [41]
- IRES Piemonte (2020), *Note brevi sul Piemonte - N. 2/2020*, [http://ires.piemonte.it/images/pubblicazioni/note-brevi/2020/2020-02\\_Nota\\_PoliInnovazione.pdf](http://ires.piemonte.it/images/pubblicazioni/note-brevi/2020/2020-02_Nota_PoliInnovazione.pdf) (accessed on 11 April 2021). [11]
- Kergel, H., G. Meier Zu Köcker and M. Nerger (2014), *New Approaches to Improve the Performance of Cluster Management Organisations in Europe*, European Secretariat for Cluster Analysis, <http://www.cluster-analysis.org> (accessed on 11 February 2021). [20]

- Koo, J. (2007), “Determinants of Localized Technology Spillovers: Role of Regional and Industrial Attributes”, *Regional Studies*, Vol. 41/7, pp. 995-1011, <http://dx.doi.org/10.1080/00343400601142746>. [23]
- Kristensen, I. and N. Mikkola (2016), *Regional Innovation Monitor Plus 2016. Regional Innovation Report. North Middle Sweden (Production related biotechnology)*. [30]
- Lämmer-Gamp, T., G. Meier zu Köcker and T. Köhler (2016), *Clusters and Entrepreneurship in Emerging Industries - Discussion Paper*, European Commission, Brussels, <https://ec.europa.eu/docsroom/documents/21121?locale=de> (accessed on 12 April 2021). [35]
- Li, J. et al. (2019), “Innovation Clusters Revisited: On Dimensions of Agglomeration, Institution, and Built-Environment”, *Sustainability*, Vol. 11/12, p. 3338, <http://dx.doi.org/10.3390/su11123338>. [39]
- Litzel, N. (2017), “Does embeddedness in clusters enhance firm survival and growth? An establishment-level analysis using CORIS data”, *Regional Studies*, NULL, pp. 563-574, <http://dx.doi.org/10.1080/00343404.2015.1115009>. [4]
- Marques, P. (2021), *Clusters and Innovation Diffusion in Piemonte, Italy. A paper prepared for the OECD report for Piedmont. Unpublished..* [25]
- Mathisen, M. and E. Rasmussen (2019), “The development, growth, and performance of university spin-offs: a critical review”, *Journal of Technology Transfer*, Vol. 44/6, pp. 1891-1938, <http://dx.doi.org/10.1007/s10961-018-09714-9>. [31]
- Menzel, M. and D. Fornahl (2010), “Cluster life cycles--dimensions and rationales of cluster evolution”, *Industrial and Corporate Change*, Vol. 19/1, pp. 205-238, <http://dx.doi.org/10.1093/icc/dtp036>. [14]
- Mueller, L. et al. (2012), *Clusters are Individuals – New Findings from the European Cluster Management and Cluster Program Benchmarking, Vol. II*, The Danish Ministry of Science Innovation and Higher Education, <https://vdivde-it.de/de/publikation/clusters-are-individuals-new-findings-european-cluster-management-and-cluster-program> (accessed on 14 February 2021). [19]
- OECD (2020), *Broad-based Innovation Policy for All Regions and Cities*, OECD Regional Development Studies, OECD Publishing, Paris, <https://dx.doi.org/10.1787/299731d2-en>. [8]
- OECD (2020), *Evaluation of the Academy for Smart Specialisation in Värmland, Sweden*, OECD Publishing, Paris, <http://www.oecd.org>. (accessed on 19 February 2021). [26]
- OECD (2020), *Managing Environmental and Energy Transitions for Regions and Cities*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/f0c6621f-en>. [55]
- OECD (2020), *OECD Interviews*. [12]
- OECD (2020), *OECD Questionnaire to Piedmont Region*. [42]
- OECD (2020), *Preparing the Basque Country, Spain for the Future of Work*, OECD Reviews on Local Job Creation, OECD Publishing, Paris, <https://dx.doi.org/10.1787/86616269-en>. [27]
- OECD (2020), *Responses by Regional Government of Piedmont to OECD questionnaire*. [10]

- OECD (2020), *Systemic Thinking for Policy Making: The Potential of Systems Analysis for Addressing Global Policy Challenges in the 21st Century*, OECD Publishing. [51]
- OECD (2019), *OECD Employment Outlook 2019: The Future of Work*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9ee00155-en>. [32]
- OECD (2019), *OECD SME and Entrepreneurship Outlook 2019*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/34907e9c-en>. [33]
- OECD (2019), *Regions in Industrial Transition: Policies for People and Places*, OECD Regional Development Studies, OECD Publishing, Paris, <https://dx.doi.org/10.1787/c76ec2a1-en>. [7]
- OECD (2018), *OECD Science, Technology and Innovation Outlook 2018: Adapting to Technological and Societal Disruption*, OECD Publishing, Paris, [https://dx.doi.org/10.1787/sti\\_in\\_outlook-2018-en](https://dx.doi.org/10.1787/sti_in_outlook-2018-en). [6]
- OECD (2018), *Productivity and Jobs in a Globalised World: (How) Can All Regions Benefit?*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264293137-en>. [21]
- OECD (2017), *Business Dynamics and Productivity*, OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264269231-en>. [34]
- OECD (2009), *Clusters, Innovation and Entrepreneurship*, Local Economic and Employment Development (LEED), OECD Publishing, Paris, <https://dx.doi.org/10.1787/9789264044326-en>. [9]
- OECD (2001), *OECD Glossary of Statistical Terms*, <https://stats.oecd.org/glossary/detail.asp?ID=1068> (accessed on 15 April 2021). [58]
- Piirainen, K., A. Tanner and L. Alkærsg (2017), "Regional foresight and dynamics of smart specialization: A typology of regional diversification patterns", *Technological Forecasting and Social Change*, Vol. 115, pp. 289-300, <http://dx.doi.org/10.1016/j.techfore.2016.06.027>. [53]
- PIMAP Partnership (2019), *D1.1 Good practices on cross-sectoral cooperation and internationalisation: Lessons learnt from the PIMAP Partnership*, [https://clustercollaboration.eu/sites/default/files/profile-article/good\\_practice\\_handbook\\_vf\\_19062019.pdf](https://clustercollaboration.eu/sites/default/files/profile-article/good_practice_handbook_vf_19062019.pdf). [43]
- Smart Specialisation Platform (2020), *S3 facilitates circular economy transition for local companies in Northern Denmark*, <https://s3platform.jrc.ec.europa.eu/-/13-s3-facilitates-circular-economy-transition-for-local-companies-in-northern-denmark?inheritRedirect=true> (accessed on 12 April 2021). [56]
- Vintage (ed.) (1969), *The Economy of Cities*, <https://www.penguinrandomhouse.com/books/86059/the-economy-of-cities-by-jane-jacobs/> (accessed on 18 February 2021). [22]

## Notes

<sup>1</sup> A cluster initiative can be defined as an organised effort by a person, organisation or consortium to support a cluster and its activities. One form of a cluster initiative is a cluster organisation, which is an organisation with an office facilitating cluster building.

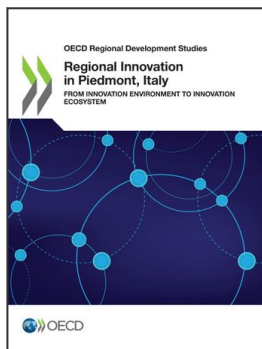
<sup>2</sup> IRES Piemonte conducted a counterfactual study to understand if the participation in the innovation poles has produced, or not, effects on business economic performance. The analysis sample is made up of participating capital companies in the 2007-2013 programming cycle. A positive effect on turnover is estimated equal to 6.2% on average in the three years following joining. The effect is calculated as a comparison between the performance observed in participating companies (group of treaties) and that observed in similar companies that are not members by sector of economic activity and budget structure located in Piedmont (control group). The study also found positive signs of participation in terms of total factor productivity (TFP) and number of employees.

<sup>3</sup> Full-time equivalent is the number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs (OECD, 2001[58]).

<sup>4</sup> [https://www.clustercollaboration.eu/sites/default/files/eu\\_initiatives/eocic\\_smart\\_guide\\_to\\_entrepreneurship.pdf](https://www.clustercollaboration.eu/sites/default/files/eu_initiatives/eocic_smart_guide_to_entrepreneurship.pdf)

<sup>5</sup> <https://climathon.climate-kic.org/>

<sup>6</sup> Technological relatedness refers to a level of similarity enabling the exchange of knowledge and efficient learning processes while providing the potential for new knowledge combinations and innovations (Balland and Boschma, 2021[57])



**From:**  
**Regional Innovation in Piedmont, Italy**  
From Innovation Environment to Innovation Ecosystem

**Access the complete publication at:**  
<https://doi.org/10.1787/7df50d82-en>

**Please cite this chapter as:**

OECD (2021), "Towards a revised cluster policy for Piedmont, Italy", in *Regional Innovation in Piedmont, Italy: From Innovation Environment to Innovation Ecosystem*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/6ed34a47-en>

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document, as well as any data and map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area. Extracts from publications may be subject to additional disclaimers, which are set out in the complete version of the publication, available at the link provided.

The use of this work, whether digital or print, is governed by the Terms and Conditions to be found at <http://www.oecd.org/termsandconditions>.