EUROPEAN CLUSTER
COLLABORATION PLATFORM

Clusters meet Regions' event "AGORADA+ discusses harnessing aerospace technologies, Smart City concepts, and life sciences for regional development" – the case of Małopolska

Input paper

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Executive Summary

The following paper presents observations on the cluster landscape in Małopolska and outlines some key considerations for the future development of the region. These considerations may pose some open strategic questions, which can be addressed in the workshops of the "Clusters meets Regions" event. The following key takeaways are summarised below:

Context: Economic profile of Małopolska

- The region of Małopolska is one of the most economically vibrant regions in Poland, with a **GDP** of €47.2 billion. Although the region has experienced robust GDP growth and a rapid post-pandemic recovery, it faces major challenges, not least due to the Russian military aggression in Ukraine.
- **Employment** in Agriculture & Mining, Utilities & Construction as well as Manufacturing sectors is above the EU27 average. This is also reflected in the composition of the ecosystem, in which Agri-Food and Construction are among the largest industrial ecosystems in terms of employment. The region shows regionally relevant specialisation nodes in the ecosystems Agri-Food and Energy Intensive Industries.
- The 2023 Regional Innovation Scoreboard classifies the region of Małopolska as a "**Moderate Innovator".** The region shows strengths in tertiary education, employed ICT specialists, and design applications. In the Regional Competitiveness Index, Małopolska performs below the EU average but above the Polish average, with strong indicators in Higher education and lifelong learning as well as innovation, yet indicates potential for development in infrastructure, technological readiness, and business sophistication.

Clusters in Małopolska and their importance for regional economic development

- Małopolska shows a small but **professional cluster landscape**, covering 7 out of 14 EU industrial ecosystems. Particular strengths can be found in the Construction, as well as in the Digital, Mobility-Transport-Automotive, and Renewable Energy ecosystems. The concentration in the Construction ecosystem includes clusters focused on smart buildings, intelligent lighting systems, composite technologies, and cleantech.
- Furthermore, the presence of a **National Key Cluster** in life sciences underlines the importance of the Health ecosystem. The Aerospace & Defence ecosystem is represented by a cluster focusing on composite technologies.
- Empirical insights from the European Cluster Panorama 2021 and Ketels & Protsiv (2021) prove how clusters can have a striking impact on economic growth and innovative business activity within regions. The former study also highlights the role of cluster organisations in Małopolska.

Cross-border cooperation and the involvement of clusters in Małopolska in European networks and support initiatives

- In the **2014-2020** period, two clusters from Małopolska participated in three ESCP projects – all under the ESPC-4x initiative. Moreover, one organisation participated in one Innosup-1 project.
- No cluster organisation from Małopolska is currently taking part in the Eurocluster initiative for 2021-2027.

Smart Specialisation in Małopolska

- The Regional Innovation Strategy of the Małopolska Region 2030 identifies **7 priority areas**. These priority areas are "Life science", "Sustainable energy", "Information & communication technologies", "Chemistry", "Production of metals, metal products & non-metallic mineral products", "Electrical engineering & machine industry" and "Creative & leisure industries".
- Cluster organisations in Małopolska contribute to all priority areas of the Regional Innovation Strategy. Nonetheless, especially the relevance of priority areas related to the **Twin Transition** ("Sustainable energy" & Information & communication technologies) stands out.

01

Context: Economic profile of Małopolska

1. Context: Economic profile of Małopolska

The Polish province of Małopolska (English: Lesser Poland) is situated in the southern part of Poland, sharing borders with Slovakia to the south. This geographic positioning grants Małopolska a great advantage for cross-border trade, particularly with its southern neighbour, enhancing its economic ties within Central Europe. The Vistula River, Poland's longest, flows through the region, providing significant logistical and trade benefits and linking Małopolska to other key economic centres in Poland. Boasting a population of 3.37 million as of 2022, the province accounts for 8.9% of the country's total population, positioning it as the third most populous county within the nation, behind the provinces of Śląskie (Silesia) and Wielkopolska (Greater Poland).[1] Spanning an area of 15,183 km^2, Małopolska holds the distinction of being the third most densely populated province in Poland, with a density of 224.3 (compared to the Polish average of 122.9 and the EU27 average of 108.9).[2] This section will provide a concise socio-economic overview of Małopolska, encompassing key aspects such as its macroeconomic profile and sectoral specialisation, as well as its innovation and regional competitiveness performances.

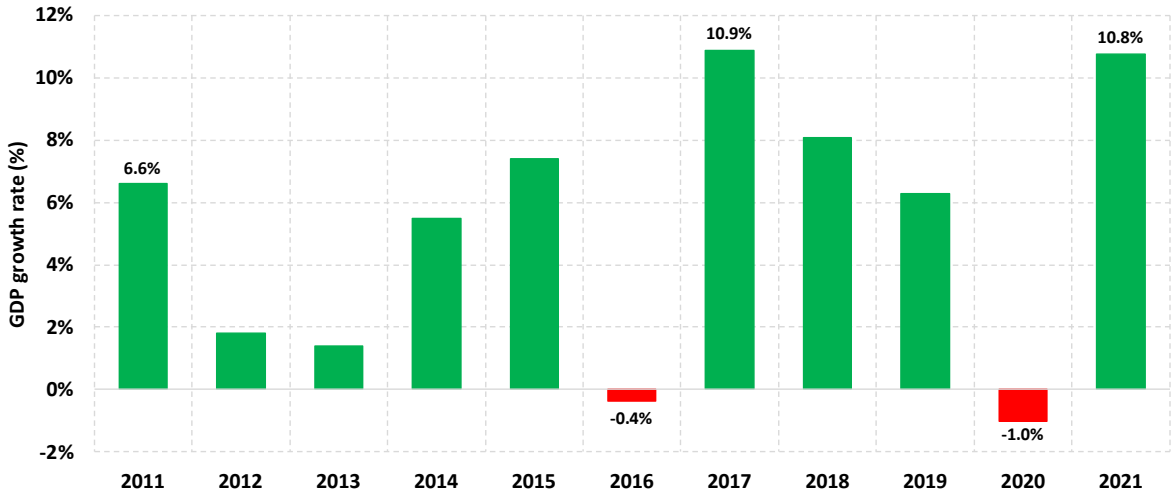
Macroeconomic profile of Małopolska

In 2021, the region's economy boasted a **per-capita GDP (PPS) of €23,000**, which placed the country below the EU average of €32,400 and the Polish average of €25,000.[3] In 2021, it accumulated a GDP of roughly €47.2 billion, as can be seen in Figure 1, which accounts for roughly 8.2% of the Polish GDP (€574,771 billion).[4] From 2011 to 2019, Małopolska's GDP growth exhibited notable fluctuations, beginning with a high of 6.6% in 2011 and reaching a peak of 10.9% in 2017 (see Figure 1). By 2019, Małopolska's economy achieved a growth of 6.3%. This performance, particularly in the years leading up to 2019, generally outpaced the national average. The impact of the COVID-19 pandemic was evident in 2020, as the region's economy contracted by 1.0%, mirroring the global economic downturn caused by the pandemic. This downturn was a result of lockdown measures, disruptions in global supply chains, and decreased consumer spending. In 2021, Małopolska's economy rebounded strongly with a growth rate of 10.8%, indicating a rapid recovery from the pandemic's impacts. This recovery was likely fuelled by the lift of COVID-19 restrictions, a resurgence in consumer demand, and supportive fiscal and monetary policies.

Nevertheless, the region's economy is contending with significant challenges, including the after-effects of the COVID-19 pandemic, which have impacted around two-thirds of its companies, especially in sectors like trade, transport, and hospitality, leading to financial issues and supply chain disruptions. Additionally, the region is facing a substantial rise in inflation, primarily due to increased energy costs, affecting the operations and financial stability of most businesses. The war in Ukraine further complicates the situation, causing raw material shortages and social challenges due to the influx of refugees.[5]

[1] Eurostat (2023): Population on 1 January by age, sex and NUTS 2 region. Available under: https://ec.europa.eu/eurostat/databrowser/view/demo_r_d2jan/default/table?lang=en (last access 10.11.2023).
[2] Eurostat (2023): Population density by NUTS 3 region. Available under: https://ec.europa.eu/eurostat/databrowser/view/demo_r_d3dens/default/table?lang=en (last access 10.11.2023).
[3] Eurostat (2023): Gross domestic product (GDP) at current market prices by NUTS2 regions. Available under https://ec.europa.eu/eurostat/databrowser/view/NAMA_10R_2GDP__custom_7751336/default/table?lang=en (last access 10.11.2023).
[4] ibid.
[5] See https://business.gmsynergy.com.pl/en/the-current-economic-situation-of-malopolska/ (last access 13.11.2023).

Figure 1 - Real GDP growth rate in Małopolska from 2011 to 2022 (in %)



Source: ECCP (2023) based on Eurostat Data.

Sector specialisations and employment levels of Małopolska

According to the calculations made in the 2023 Regional Innovation Scoreboard, the service sector, representing 56.4% of the region's total employment, surpasses the Polish average, yet falls below the EU average (See Table 1 in the Annex).[6] Contrarily, Agriculture & Mining in Małopolska, employing 9.2% of the workforce, exceeds the EU's 4.4% average but remains slightly below the national average of 10.3%. Manufacturing contributes 17.5% to employment, higher than the EU average of 16.4%, albeit lower than Poland's 20.1%. The Utilities & Construction sector exhibits a share of 12.2% of the total employment and also outperforms both national and EU averages.

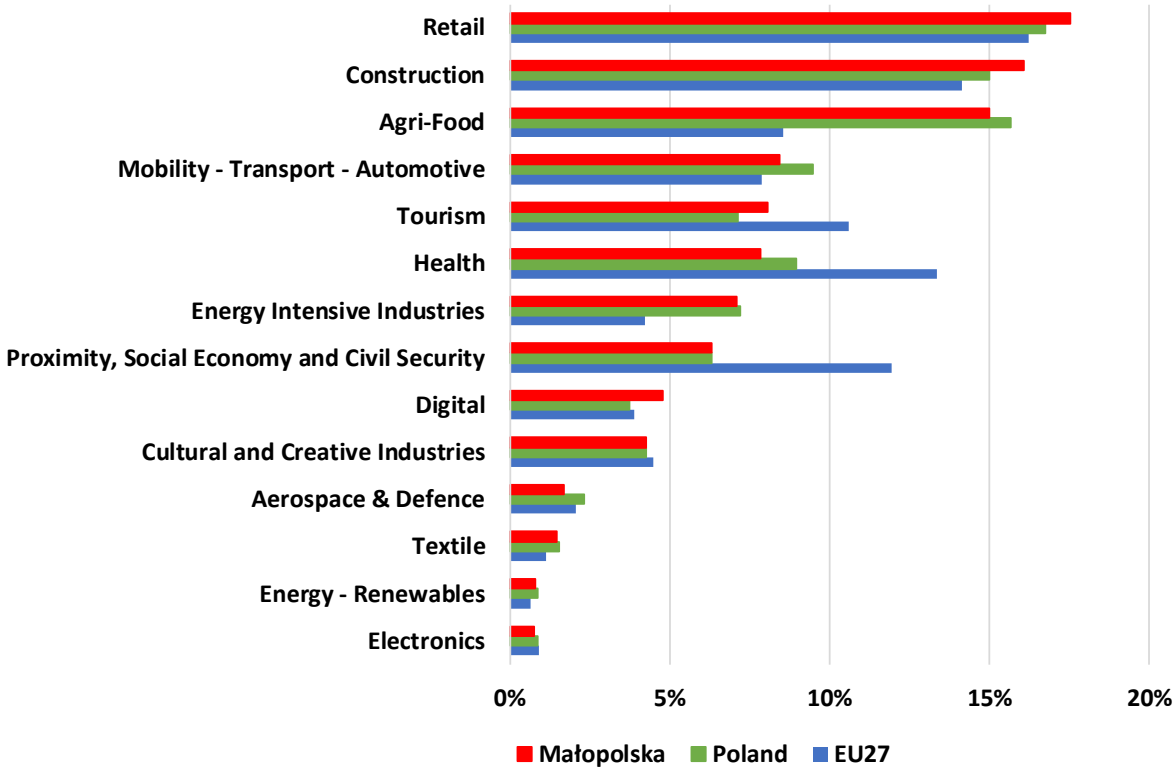
The notable prominence of the Agriculture sector in Małopolska is largely attributable to *Crop and animal production, hunting, and related services.* This subsector ranks as the second largest in employment, boasting 121,900 workers in 2020. Additionally, the robust representation in Utilities & Construction is evident through *specialised construction activities*, *Land transport and transport via pipelines*, and *building construction*, all featuring among the top 10 employment sectors. A comprehensive breakdown of the key economic sectors in Małopolska in terms of employment is presented in Figure 13 of the Annex.

As part of its Industrial Strategy (March 2020), the European Commission has selected **14 industrial ecosystems** that are particularly relevant in Europe and encompass all players operating in a value chain.[7] The classification of the 14 industrial ecosystems has been calculated by aggregating NACE 2-digit activities, following the methodology established by the European Commission.[8] In Małopolska, the **Retail ecosystem**, with 17.5%, emerges as the largest employment ecosystem, and surpassing both the EU27 (16.2%) and national averages (16.7%), as shown in Figure 2. This is followed by **Construction**, at 16.1% being higher than the EU27 and national average. Moreover, the **Agri-Food ecosystem**, which makes up 15.0% of employment across all ecosystems, comprises the third largest ecosystem by employment. The importance of this ecosystem is observed when

[6] EU Commission (2023): Regional innovation Scoreboard 2023 – Regional profiles Poland. Note: These are average shares from 2019-2021.
[7] See here for more information https://clustercollaboration.eu/in-focus/industrial-ecosystems (last access 24.07.2023).
[8] See European Commission (2021): Annual Single Market Report, SWD (2021), available online https://commission.europa.eu/system/files/2021-05/swd-annual-single-market-report-2021_en.pdf (last access 24.07.2023).

comparing it to the EU average of 8.5%. Other ecosystems that demonstrate a higher concentration of employment compared to the EU27 average include **Mobility – Transport – Automotive, Energy Intensive Industries, Digital, Textile** and **Energy – Renewables**.

Figure 2: Employment across the industrial ecosystems for Małopolska, Poland and the EU27 (in 2020)



Source: ECCP (2023), own elaboration based on Eurostat.

To analyse specialisation in Małopolska, this paper examines the country's regionally relevant sectoral and ecosystem nodes.[9] In the region, there is a total of **8 regionally relevant sectoral nodes**, while there is a total of **2 regionally relevant ecosystem nodes observed**.[10] The sector *Manufacture of wood and of products of wood and cork, except furniture* exhibits the node with the highest sector concentration. This and the node in the sector of *Crop animal production, hunting and related service activities* are covered by the **Agri-Food ecosystem**, which exhibits a regionally relevant ecosystem node. Furthermore, the *manufacture of rubber and plastic products* as well as the *manufacture of basic metals* exhibits sectoral nodes. These sectors are part of the **Energy Intensive Industries ecosystem**, which constitutes the second ecosystem node in the region. Other nodes can be found in sectors such as the *Construction of buildings* as well as *Civil engineering*, both of which mainly correspond to the Construction ecosystem.

[9] Specialisation can be measured through Location Quotients (LQ) that reflect the relative specialisation of an activity in a region compared to the EU average. If the LQ for a given activity-region combination is above 1.5, it is considered a specialisation node and if the activity accounts for at least 1 % of total employment in the region, it is considered regionally relevant.

[10] An overview of the regionally relevant sectoral and ecosystem nodes of Małopolska can be found in the Annex, presented in Table 2 and Table 3, respectively.

Drawing on the European Cluster Panorama 2021, visual representations of industrial ecosystem specialisations in the regions across the EU27 are provided (see also Figure 14 in the Annex).[11] This can enhance one's understanding of cluster organisation concentration on the basis of specific typologies and give a perception as to how they vary across regions and countries. As depicted in Figure 3, the regions of Poland are categorised into four specialisation groups, while one region is not classified into any specialisation group. The region of Małopolska is **classified as Energy/Industry**, highlighting its distinctive strengths in energy-intensive industries. Furthermore, the analysis shows a strong specialisation in the Agri-Food ecosystem. These are consistent with the priority areas of the S3 of Małopolska, such as "Life science", "Sustainable energy", "Production of metals, metal products & and non-metallic mineral products" as well as "Electrical engineering & machine industry".

Regional innovation level of Małopolska

This paper aims to examine the economic performance of Małopolska with a specific focus on clusters and how they are organised. To complement this chapter, the region's economic profile, the Regional Innovation Scoreboard (RIS) provides an avenue for assessing its level of innovativeness. The RIS framework is structured into the following four categories "Framework Conditions", "Investments", "Innovation Activities" and "Impacts". The data provided by the Regional Innovation Scoreboard is only available at the NUTS-2 level.

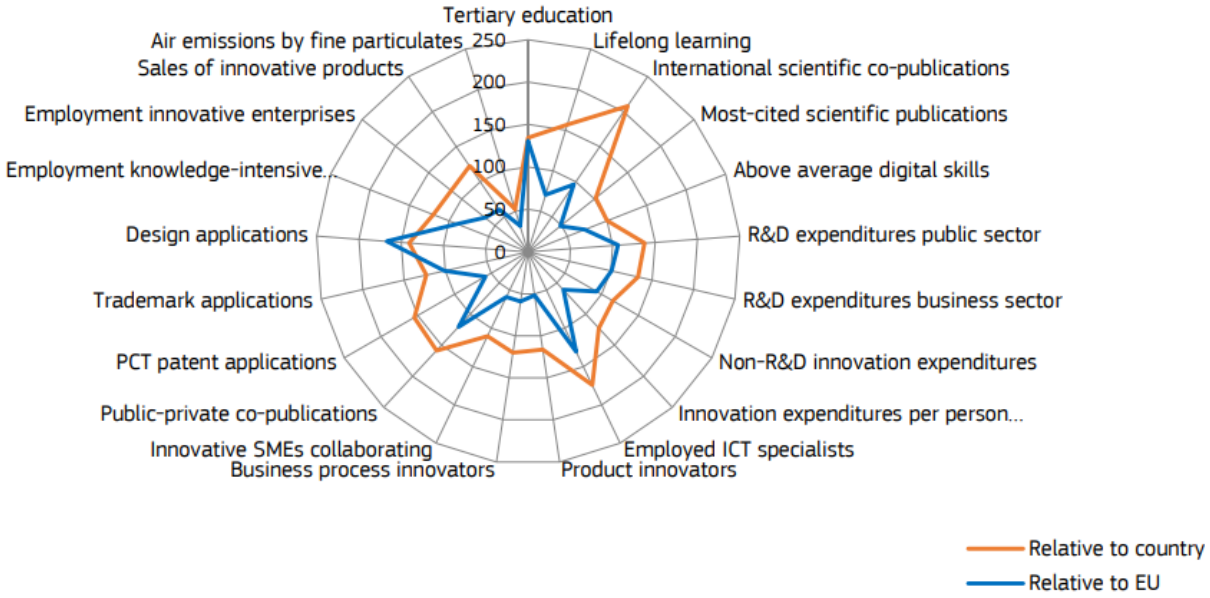
The region of Małopolska stands out as a **"Moderate Innovator"** with a score of 80.2, making it the region with the second-highest overall score in Poland, after the capital region. Over time, its innovation performance has improved significantly, with a 19.3% increase since 2016. Małopolska's regional innovation ecosystem showcases considerable strengths across various dimensions. The high score in tertiary education, which complements the high score in the number of Employed ICT specialists, indicates a well-educated workforce adept in technology and digital competencies. Design applications are another area where Małopolska excels, reflecting a strong creative industry that is capable of generating intellectual property and fostering innovation. The region also benefits from a collaborative environment, as evidenced by the number of public-private co-publications, suggesting effective partnerships between academia and industry. Lastly, scores around the EU average in R&D expenditures in both the public and business sectors signal a moderate investment in innovation, driving research and development at both institutional and corporate levels, and setting the stage for future growth and technological advancement. In the realm of collaborative research, Małopolska shows promising signs within the Polish innovation ecosystem. International scientific co-publications and public-private co-publications, though below the EU27 average, stand above the Polish average. This suggests a willingness to engage in collaborative innovation efforts that transcend regional boundaries, facilitating knowledge transfer and shared expertise. The performance of product and business process innovators also exceeds the national average, suggesting that Małopolska is fostering an environment conducive to practical innovation and the refinement of business operations. These findings underscore that the regional innovation system, despite being in the process of development, surpasses the national context in essential collaborative and entrepreneurial aspects.

Małopolska's innovation ecosystem, while showing areas of strength, also displays several indicators pointing to potential areas for improvement when compared to the EU27 average. The indicator "Most cited scientific publications", a measure of research impact and quality, shows a need for enhancement of research outputs. Innovation expenditures per person employed suggest an opportunity to increase investment in innovative activities in the region. Furthermore, the region's product innovators and business process innovators demonstrate room for growth in developing new products and improving processes. Collaborations among

[11] ECCP (2021): European Cluster Panorama Report 2021. Available under: https://clustercollaboration.eu/sites/default/files/2021-12/European_Cluster_Panorama_Report_0.pdf (last access 13.11.2023).

innovative SMEs are also an area where Małopolska could benefit from intensified efforts, fostering a more vibrant and interconnected small and medium-sized enterprise sector. Addressing these areas could propel the region towards a more competitive stance within the European innovation landscape.

Figure 3: Innovation performance of Małopolska in the 2023 Regional Innovation Scoreboard



Source: European Commission (2023): Regional Innovation Scoreboard 2023 – Regional profiles Poland.

Regional competitiveness level of Małopolska

To conclude the chapter on the region's economic profile, the focus lies on the ranking of Małopolska in the Regional Competitiveness Index. This index measures key aspects of competitiveness among regions across the EU in three dimensions: the Basic Sub-Index, the Efficiency Sub-Index and the Innovation Sub-Index.

A detailed overview of the region's performance in various indicators and dimensions of the Regional Competitiveness Index is provided in Figure 15 in the Annex. According to this, the region of Małopolska overall performs above the EU average, with a score of 94.3, ranking 127th out of all 234 regions assessed in the Regional Competitiveness Index and the third highest across all Polish provinces. Particularly, the region exhibits a commendable performance in the Efficiency Sub-Index, outperforming the Polish average and exhibiting roughly around the EU27 average. This performance can be traced back to outperforming scores in the Higher education and LLL and Labour market pillars. In the Innovation Sub-Index, the region of Małopolska exhibits a performance higher than the Polish average, albeit below the EU27 average. Within this sub-index, the innovation pillar stands out, surpassing both the national and EU27 average.

The Regional Competitiveness Index also reveals areas for potential improvement. The region displays relative weaknesses in the infrastructure pillar, lagging behind both EU and Polish averages, which suggests a need for upgraded and more extensive infrastructure investments. Health services and market size also fall short relative to the EU27, indicating room for improvement in healthcare delivery and market expansion to foster economic growth. Technological readiness and business sophistication, especially the latter which scores the lowest, though above the Polish average, highlight the need for strategic development in these areas to enhance overall competitiveness and innovation capacity.

02

Clusters in Małopolska & their importance for regional economic development

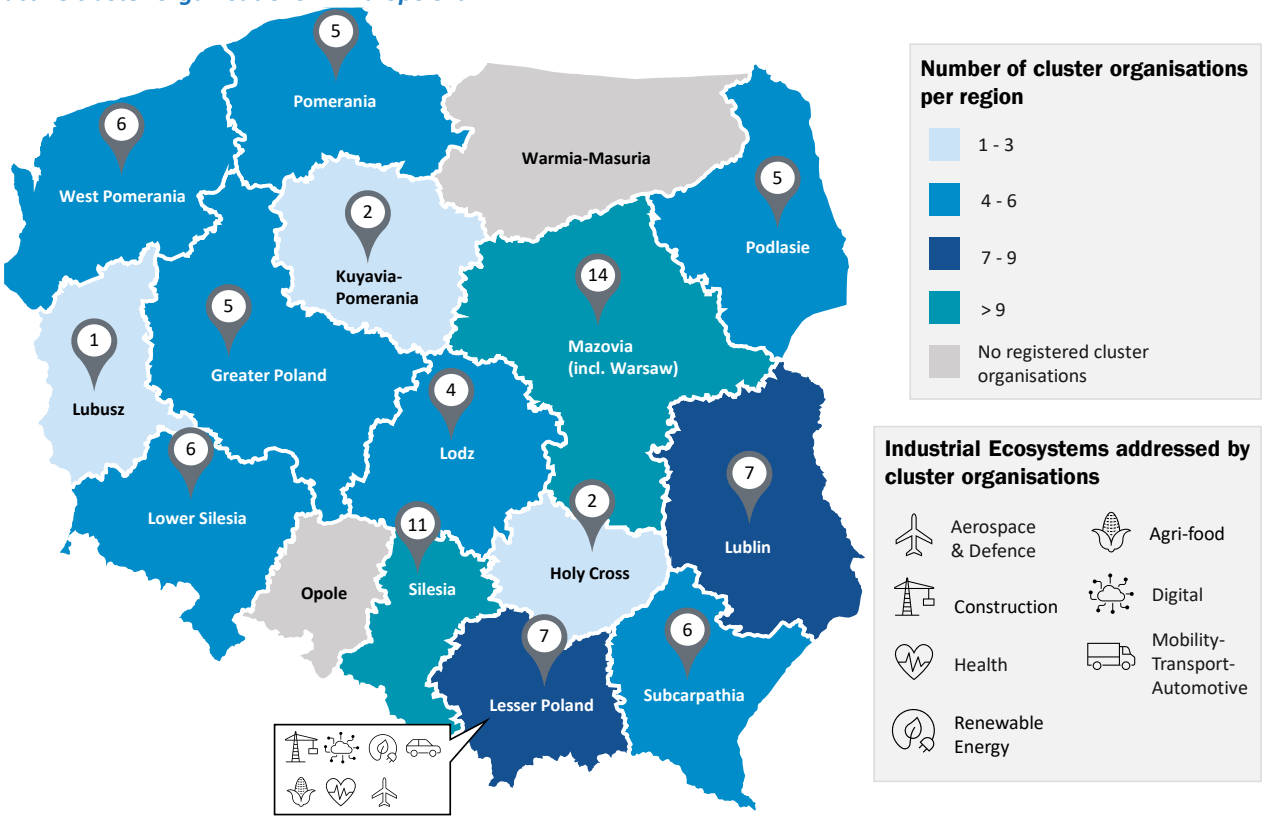
2. Clusters in Małopolska and their importance for regional economic development

The involvement of clusters in regional economic governance, policy design and implementation at the regional level is of central importance for regional economic development. This chapter will provide an overview of the cluster landscape in Małopolska and the policy framework under which cluster organisations are operating in the region.

Clusters in Małopolska

The European Cluster Collaboration Platform serves as a one-stop-shop for cluster organisations at the European level. Therefore, the number of registered cluster organisations and other innovation actors in Małopolska on the ECCP gives the first impression of the intensity of organisation in regional industrial networks. Out of the total 1,148 registered EU27 cluster organisations on the ECCP, there are **81 cluster organisations from Poland** as a whole and **seven from the region of Małopolska**.

Figure 4: Overview of ECCP-registered cluster organisations in Poland as well as the sectoral distribution of active cluster organisations in Małopolska



Source: ECCP (2023). Own elaboration based on https://reporting.clustercollaboration.eu/all (last access 13.11.2023). A full overview of the cluster organisations in Małopolska/Lesser Poland is provided in Table 4 in the Annex.

Figure 4 displays the geographical distribution of the cluster organisations across the country and the sectoral focus in Małopolska (Lesser Poland). The region shows a mid-sized cluster landscape and is well embedded in a neighbourhood of regions with strong cluster landscapes in Śląskie (Silesia) to the West and Podkarpackie

(Subcarpathia) to the East, as well as Moravskoslezský (Moravian Silesia) on the other side of the national border to Czechia.[12]

The cluster organisations in Małopolska can be related to **7 out of 14 different EU industrial ecosystems**[13] (see also Table 4 in the Annex). The **strongest industrial ecosystem is Construction** with five cluster organisations involved. Next are Digital, Mobility-Transport-Automotive, and Renewable Energy with two cluster organisations each. Finally, Health, Agri-food, and Aerospace & Defence are each represented by one cluster organisation. The strong concentration in the Construction sector is also reflected in the distribution of the workforce (see Chapter 1) and includes clusters focused on smart buildings, intelligent lighting systems, composite technologies, and cleantech.

Figure 5: Overview of organisation, structure, and thematic orientation of ECCP-registered cluster organisations in Małopolska

Organisation

- Majority of cluster organisations (6) rather small with 1-5 employees (86%; ØEU: 55%)
- One larger cluster organisations with 6-10 employees (14%; ØEU: 16%)

Member structure

- Majority of cluster organisations (5) rather small with up to 100 members (72%; ØEU: 61%)
- Two larger cluster organisations with over 101-200 members (28%; ØEU: 21%).

Thematic orientation

- Cluster organisations in Małopolska can be related to 7 different EU industrial ecosystems
- Collaboration particularly sought in internationalisation, partnering for projects, and digitalisation

Source: ECCP (2023).

As shown in Figure 5 above, the majority of ECCP-registered cluster organisations in Małopolska are rather small in size with six out of seven cluster organisations employing a staff of up to five employees. Looking at the membership structure this picture is confirmed with five out of seven cluster organisations counting up to 100 and two between 101 and 200 members. In both metrics, the region has smaller cluster organisations than the EU average. Collaboration interests are primarily in internationalisation, partnering for projects, and digitalisation. Cluster organisations in the region have been awarded one Bronze and one Silver Cluster Excellence Label.

The importance of clusters for regional economic competitiveness

The European Cluster Panorama Report (2021) examines the relationship between clusters and regional competitiveness. The stand-out findings of this report showcase how the presence of cluster organisations is

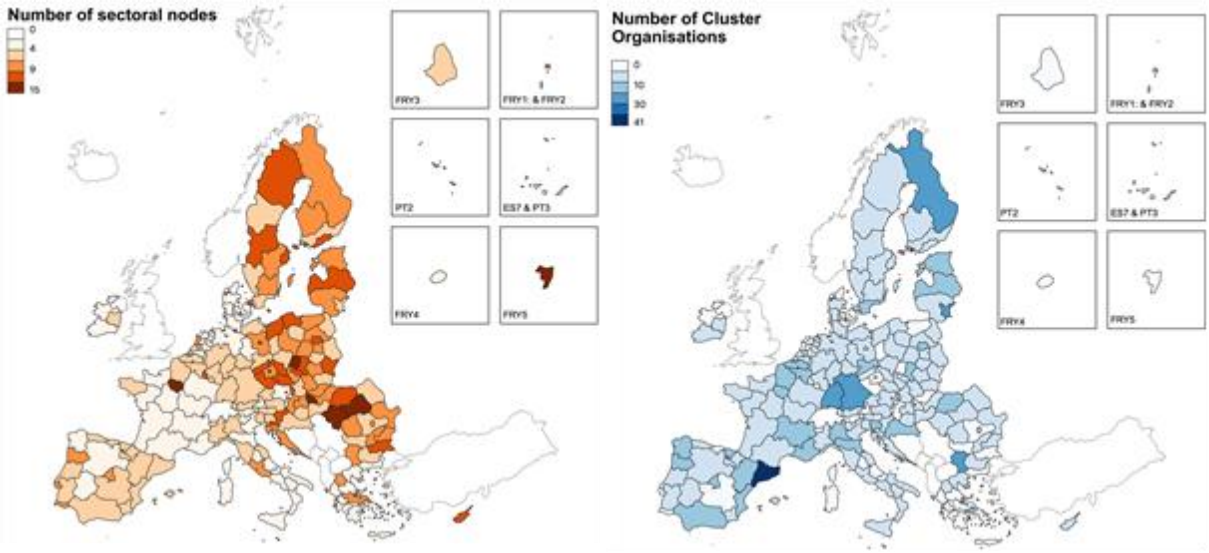
[12] See the Input paper for the Clusters meet Regions event in Prague from October 2023. Available under: https://clustercollaboration.eu/sites/default/files/document-store/ECCP_CMR_InputPaper_Czechia_Final.pdf (last access 13.11.2023).

[13] see European industrial strategy. Available under: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en (last access 13.01.2023)

positively correlated with economic indicators such as GDP per capita, labour productivity, as well as business R&D expenditure. While public R&D expenditure is merely positively correlated with industry-relevant nodes[14], it does indicate how regions could earn greater public support when certain industries have a local significance. Particularly indicators of R&D expenditures are key in measuring economic performance concerning innovation.

Figure 6 below shows that industries in Małopolska feature an average number of eight regionally relevant sectoral specialisation nodes[15], along with an average number of cluster organisations when measured against other European regions.

Figure 6: Distribution of region-relevant sector specialisation nodes and cluster organisations in EU-27



Source: ECCP (2023), own contribution based on Eurostat and ECCP data.

Next to clusters having an enabling and facilitating effect on economic performance and growth, other studies have provided complementary information on the impact clusters can have. For example, Ketels & Protsiv (2021)[16] provide a thorough account of the positive relationship between cluster presence and industry-level wages across European regions. Key takeaways emphasise how particular clusters relate to sector-specific industries, as opposed to the mere "concentration of economic activity in a specific field" (p. 217). On top of that, the data showcases how the influence and strength of clusters have an independent relationship with economic outcomes. Their findings suggest how the degree and nature of competitiveness within clusters must be understood on a location-to-location basis. This further reflects on what they refer to as the "business environment quality" that can have striking knock-on effects on wage levels. Most importantly, Ketels & Protsiv delineate how "cluster strength" has a unique impact on "wages and prosperity".

[14] From the European Cluster Panorama Report (2021): Industry-relevant specialisation nodes: When the region is specialised in the sector (or industrial ecosystem) and regional employment in the sector is relevant in the EU context (industry employment share > 1%).

[15] From the European Cluster Panorama Report (2021): Region-relevant specialisation nodes: When the region is specialised in the sector and the employment share of that sector is relevant for the region (regional employment share > 1%).

[16] Ketels, C. & Protsiv, S. (2021): Cluster presence and economic performance: a new look based on European data, Regional Studies, 55:2, 208-220, DOI: 10.1080/00343404.2020.1792435. Available under: https://www.tandfonline.com/doi/full/10.1080/00343404.2020.1792435 (last access 06.03.2023).

A visual depiction that highlights this trend can be found in Figure 16 in the Annex. In the context of the region of Małopolska, the statistical data and analysis of Ketels and Protsiv show a below-average cluster portfolio strength (share of payroll accounted for by strong clusters) and an above-average cluster mix (bias towards cluster categories with higher wages). In other words, Małopolska's clusters are active in sectors with generally higher wages, but they are not necessarily responsible for a large part of the region's payroll, i.e., their regional economic weight is less important as in other regions.

Cluster policy in Poland

The remainder of this chapter will, firstly, look at the policy context for cluster development at the national as well as regional and local level and, secondly, evaluate the success of cluster policy in strengthening regional economic development so far.

On the **national level**, the Polish cluster policy is implemented through the National Key Clusters programme.[17] Clusters are selected to be part of the programme along five criteria: human, infrastructural and financial resources; economic potential of the cluster; creation and transfer of knowledge; activities for public policies; and customer orientation. National Key Clusters enjoy preferential and sometimes exclusive access to financing through the national and EU-co-funded programmes. In the new funding period, clusters are supported through the European Funds for Modern Economy 2021-2027 programme.[18] A list of the National Key Clusters can be consulted on the government's website.[19] For further information on the Polish cluster policy, see also the ECCP country factsheet.[20] Furthermore, Polish clusters are organised in the *Polish Cluster Association Klastry Polskie*.[21]

When it comes to an **assessment of Polish cluster policy**, Kuberska and Mackiewicz (2022)[22] emphasise the benefits of platforms for cooperation between clusters at the regional as well as the National Key Clusters certification and cluster policy advisory bodies at the national level. Furthermore, the internationalisation of cluster activities has been highlighted by respondents as particularly important for business development. However, poor coordination between national and regional levels has hampered successful cluster development. This lack of a coordinated approach and declining public support for cluster organisations in the years before 2020 was particularly harmful for less developed regions and clusters, while the more developed ones managed to consolidate their position and professionalise their operations.

A recent report[23] analysed the role of cluster organisations in facilitating business-research cooperation across the Visegrád countries. It shows that compared with Czechia and Hungary, Poland's innovation system is lagging when it comes to collaborations between businesses and academic and other research institutions. The country report[24] on Poland then points out that the "development of Polish clusters may be an effective method to overcome one of the primary impediments to the economy's innovativeness, namely the low degree of

[17] Ministry of Development and Technology (2021): National Key Clusters. Available under: https://www.gov.pl/web/rozwoj-technologia/krajowe-klastry-kluczowe (last access 14.11.2023).
[18] Ministry of Development Funds and Regional Policy (2022): European Funds for the Modern Economy 2021-2027. Available under: https://www.poir.gov.pl/strony/o-programie/fe-dla-nowoczesnej-gospodarki/zalozenia-programu-feng/ (last access 14.11.2023).
[19] List of National Key Clusters: https://www.gov.pl/web/rozwoj-technologia/lista-kkk (last access 14.11.2023).
[20] ECCP (2022): Country factsheet Poland. Available under: https://clustercollaboration.eu/sites/default/files/2023-06/ECCPfactsheet_Poland_2022_final.pdf (last access 14.11.2023).
[21] See https://en.klastrypolskie.pl/ (last access 14.11.2023).
[22] Kuberska, D. & Mackiewicz, M. (2022): Cluster Policy in Poland – Failures and Opportunities, sustainability, 14:3. Available under: https://www.mdpi.com/2071-1050/14/3/1262 (last access 14.11.2023).
[23] Mackiewicz, M. (ed., 2022): Clusters as platforms for business-research (B2R)/research-business (R2B) relations, Visegrad Fund project No. 22030333. Available under: https://v4clusters.sgh.waw.pl/pl/node/39 (last access 14.11.2023).
[24] Grzybowska-Brzezińska, M, et al. (2022): Clusters as platforms for business-research (B2R)/research-business (R2B) relations, Country Report – Poland, Visegrad Fund project No. 22030333. Available under: https://v4clusters.sgh.waw.pl/index.php/pl/node/31 (last access 14.11.2023).

collaboration" (p. 4). One successful outcome of Polish cluster collaboration has been the integration of Polish businesses into international R&D projects. It remains to be seen whether Polish clusters' increasingly transnational networks can also reinvigorate their comparatively weakly developed local collaborations.

On the **regional level**, clusters have a firm place in the *Regional Innovation Strategy of the Małopolska Region 2030*.[25] Clusters are seen as an important infrastructure for internationalisation and transregional cooperation in innovation and value chains. They are a central building block of the region's innovation strategy. A stand-out example is the Life science Cluster, which is one of 15 National Key Clusters and well-integrated in international programmes, projects, and initiatives.[26] Overall, clusters in the Małopolska region are part of an integrated system of business support that also includes infrastructure for the training of personnel, networking with venture capital and seed funds, and a strong connection with the local universities.

The *Małopolska Regional Development Agency* (Małopolska Agencja Rozwoju Regionalnego, MARR)[27] is tasked with implementing entrepreneurial support programmes and EU projects, offering financial instruments to implement business projects, providing services for investors and conducting international promotion activities. It is also involved in the Business in Małopolska Center, which, in cooperation with the Małopolska Region and the Krakow Technology Park, offers an integrated system of services for investors and exporters.[28]

In **conclusion**, the Małopolska region shows a professional cluster landscape that benefits from an integrated system of business support services and the importance granted to clusters in the regional innovation strategy. The EU Cluster Panorama Report (2021) in connection with Ketels & Protsiv (2021) further makes the case for cluster organisations as a proven method to stimulate long-term growth and innovative activity on a regional level.

[25] Marshal's Office of the Małopolska Region (2021): Regional Innovation Strategy of the Małopolska Region 2030. Department of Ownership Supervision and Economy. Kraków, February 2021. Available under: https://www.malopolska.pl/_userfiles/uploads/RG-X/Regional%20Innovation%20Strategy%20of%20the%20Ma%C5%82opolska%20Region%202030.pdf (last access 14.11.2023).
[26] See https://lifescience.pl/ (last access 14.11.2023).
[27] See https://www.marr.pl/en/main/ (last access 14.11.2023).
[28] See https://www.businessinmalopolska.pl/en (last access 14.11.2023).

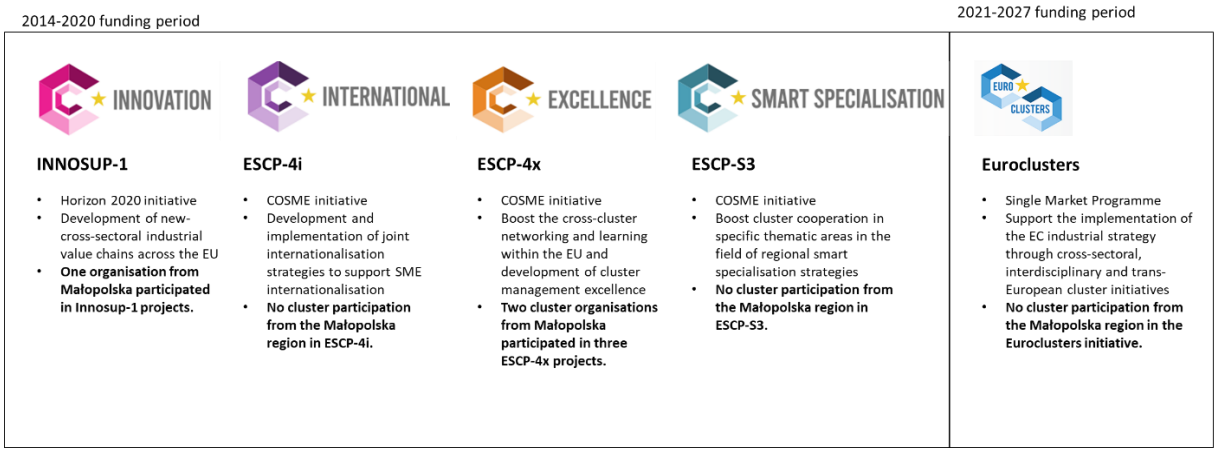
03

Cross-border cooperation and the involvement of clusters in Małopolska in European networks & support initiatives

3. Cross-border cooperation and the involvement of clusters in Małopolska in European networks and support initiatives

Findings from the Evaluation Study of and Potential Follow-Up to Cluster Initiatives under COSME, H2020 and FPI of the European Commission (2021) show that cross-border cooperation is perceived by innovation stakeholders as a highly relevant activity for clusters to support sustainable growth and resilience-building of their SME members.[29] These findings have been confirmed by a substantial body of scientific literature on the topic. For example, a 2020 paper by K.A. N'Ghauran and C. Autant-Bernard found that "*cluster policies can significantly enable their members to be more engaged in co-inventions*"[30], especially at the inter-regional level. To gain an overview of the existing cross-border cooperation of regional clusters from Małopolska, a closer look will be taken in this chapter on their involvement in European support initiatives, with a focus on the 2014-2020 funding period as well as the Joint Cluster Initiatives (Euroclusters) for Europe's recovery of the 2021-2027 period.

Figure 7: Overview of EU support initiatives in the funding period 2014-2020 and 2021-2027



Source: ECCP (2023).

Involvement of cluster organisations in Małopolska in the European Strategic Cluster Partnerships (ESCP)

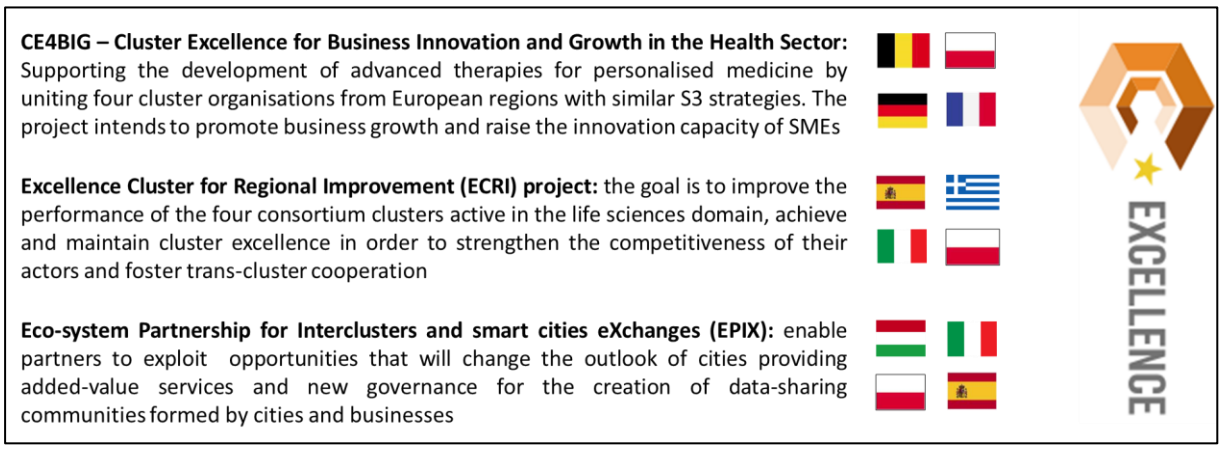
In the 2014-2020 funding period, one relevant EU support initiative to increase cross-border cooperation of EU cluster organisations and other intermediary organisations was the European Strategic Cluster Partnership (ESCP) initiative funded under the EU Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME). The ESCP initiative established partnerships between European clusters and intermediary organisations from the different EU Member States or associated countries. Those partnerships

[29] Prognos et al. (2021): Evaluation Study of & Potential Follow-Up to Cluster Initiatives under COSME, H2020 & FPI (DG GROW, Unit D2 - Industrial Forum, alliances, clusters). Study on behalf of the European Commission. Available under: https://op.europa.eu/en/publication-detail/-/publication/a2c3e9e1-3deb-11ec-89db-01aa75ed71a1/language-en/format-PDF/source-241039860 (last access 10.01.2023).

[30] N'Ghauran, K. A. & Autant-Bernard, C. (2020): Assessing the Collaboration and Network Additionality of Innovation Policies: A Counterfactual Approach to the French Cluster Policy. Available under: https://ssrn.com/abstract=3540072 or http://dx.doi.org/10.2139/ssrn.3540072

focused on three different thematic areas, which were internationalisation (ESCP for Going International), cluster excellence (ESCP for Excellence) and smart specialisation (ESCP for Smart Specialisation).[31]

Figure 8 - Overview of the three ESCP-4x projects in the Małopolska region



Source: ECCP (2023).

Figure 8 gives an overview of the region's clusters that have participated or are participating in the ESCP initiative. As the figure shows, two clusters from the Małopolska region have participated or are participating in three ESCP for Excellence (ESCP-4x) projects. These were:

1. The *LifeScience Kraków Cluster*, which participated in:
    a. The project CE4BIG – Cluster Excellence for Business Innovation and Growth in the Health Sector – that brought together four European healthcare clusters with similar regional smart specialisation strategies, supporting the development of advanced therapies for personalised medicine. The project intends to promote business growth and raise the innovation capacity of SMEs.
    b. The Excellence Cluster for Regional Improvement (ECRI) project, whose goal is to improve the performance of the four consortium clusters active in the life sciences domain, achieve and maintain cluster excellence in order to strengthen the competitiveness of their actors and foster trans-cluster cooperation.
2. The SIC – sustainable infrastructure cluster, which participated in the Eco-system Partnership for Interclusters and Smart Cities eXchanges (EPIX) project. The main objective of EPIX is to enable its partners to exploit opportunities that will change the outlook of cities providing added-value services and new governance for the creation of data-sharing communities formed by cities and businesses. More specifically, it sought to increase skills and competencies of 15 cluster managers; promote cross-cluster value chain interconnections; develop comprehensive and focused clusters' strategies.

[31] For more information on the European Cluster Partnerships see: https://clustercollaboration.eu/eu-cluster-partnerships (last access 13.01.2023).

Involvement of organisations in Małopolska in the INNOSUP-1 initiative

Apart from the ESCPs, the INNOSUP-1 initiative "Cluster facilitated projects for new value chains", funded under the EU programme Horizon 2020, was a relevant EU support initiative that addressed the challenge to develop new cross-sectoral industrial value chains in Europe through European cooperation of cluster organisations and other relevant intermediaries.[32] The INNOSUP-1 initiative aimed at boosting the cross-sectoral and cross-border cooperation in consortia of European cluster organisations and other relevant innovation intermediaries.[33] An innovative approach of the INNOSUP-1 initiative was that it consisted of the so-called cascade funding approach, meaning that cluster organisations served as intermediaries to support their SME members through different support instruments like direct financial support or capacity-building training. Findings from the Evaluation Study of and Potential Follow-Up to Cluster Initiatives under COSME, H2020 and FPI of the European Commission (2021) confirm that the transnational component of the cluster initiatives was perceived by beneficiaries as an EU added value with high mutual learning effects for cluster organisations and the supported SMEs.

Only one organisation from Małopolska, the *Mineral and Energy Economy Research Institute of the Polish Academy of Sciences* (Instytutu Gospodarki Surowcami Mineralnymi i Energią Polskiej Akademii Nauk)**,** participated in the INNOSUP-1 initiative, under the project GreenOffshoreTech. The project aimed to develop innovative products, processes or services for green offshore production and transport towards a resource-efficient Blue Economy, by establishing a framework for cross-sectoral and transnational collaboration between SMEs, clusters and regions. Currently ongoing (with a predicted end date of 31 August 2024), it initially sought to support at least 100 SMEs and 100 innovative SME projects aimed at developing new innovative products, processes or services, initially through financial support and a range of Business Support Services, and subsequently by creating a platform to facilitate cooperation between clusters and SMEs.

[32] For more information on the ESCPs and the INNOSUP-1 initiative see: https://clustercollaboration.eu/eu-cluster-partnerships (last access 04.02.2022).

[33] European Commission (2020): Study on the effectiveness of public innovation support for SMEs in Europe. Annex E, INNOSUP evaluations. Available under: https://op.europa.eu/en/publication-detail/-/publication/888d351a-9d97-11eb-b85c-01aa75ed71a1/language-en (last access 10.01.2023).

04

Smart Specialisation in Małopolska

4. Smart Specialisation in Małopolska

Cluster organisations (can) play an important role in the design and implementation of Smart Specialisation Strategies (S3) since in both concepts, the promotion of economic growth and competitiveness through regional proximity are key elements. Box 1 provides some good practices of cluster involvement in S3 from other European regions and especially in the Entrepreneurial Discovery Process[34] (EDP). Against this background, this chapter focuses on Smart Specialisation in Małopolska.

The S3 of Małopolska

A key starting point for the analysis of the Małopolska S3 2021-2027 is the Regional Innovation Strategy of the Małopolska Region 2030.[35] This innovation strategy was developed by the Marshal's Office of the Małopolska Region and was published in 2021. Cluster organisations play a key role in the Regional Innovation Strategy of the Małopolska Region 2030. For instance, several cluster organisations are mentioned as key strengths in the different identified priority areas of the strategy. Moreover, cluster organisations are regarded as key actors when it comes to the transfer of knowledge and adapting good practices implemented by other enterprises.

The Regional Innovation Strategy of the Małopolska Region 2030 identifies **seven priority areas** which are summarised in Figure 9. These priority areas address a wide range of topics ranging from "Life science" over "Information & communication technologies" to "Creative & leisure industries".

Figure 9: Priority areas of the S3 of Małopolska

Source: ECCP (2023), own elaboration based on the Regional Innovation Strategy of the Małopolska Region 2030.

[34] The entrepreneurial discovery is an interactive and inclusive process in which the relevant actors identify new and potential activities and inform the government. The government assesses this information and empowers those actors most capable of realising the potential. See https://s3platform.jrc.ec.europa.eu/edp (last access 18.07.2023).
[35] see here https://www.malopolska.pl/_userfiles/uploads/RG-X/Regional%20Innovation%20Strategy%20of%20the%20Ma%C5%82opolska%20Region%202030.pdf (last access 07.11.2023).

Box 1: Good practices of cluster involvement in S3

Good practices of cluster involvement in S3

Berlin/Brandenburg – Cluster 'Master Plans':
In Berlin/Brandenburg, cluster organisations developed 'Master Plans' for priority areas in which specific objectives and actions for implementation were laid out. Thereby, an important element of these 'Master Plans' is the highly participatory and consultative process in which the various stakeholders are involved and can postulate their opinions on the priorities.

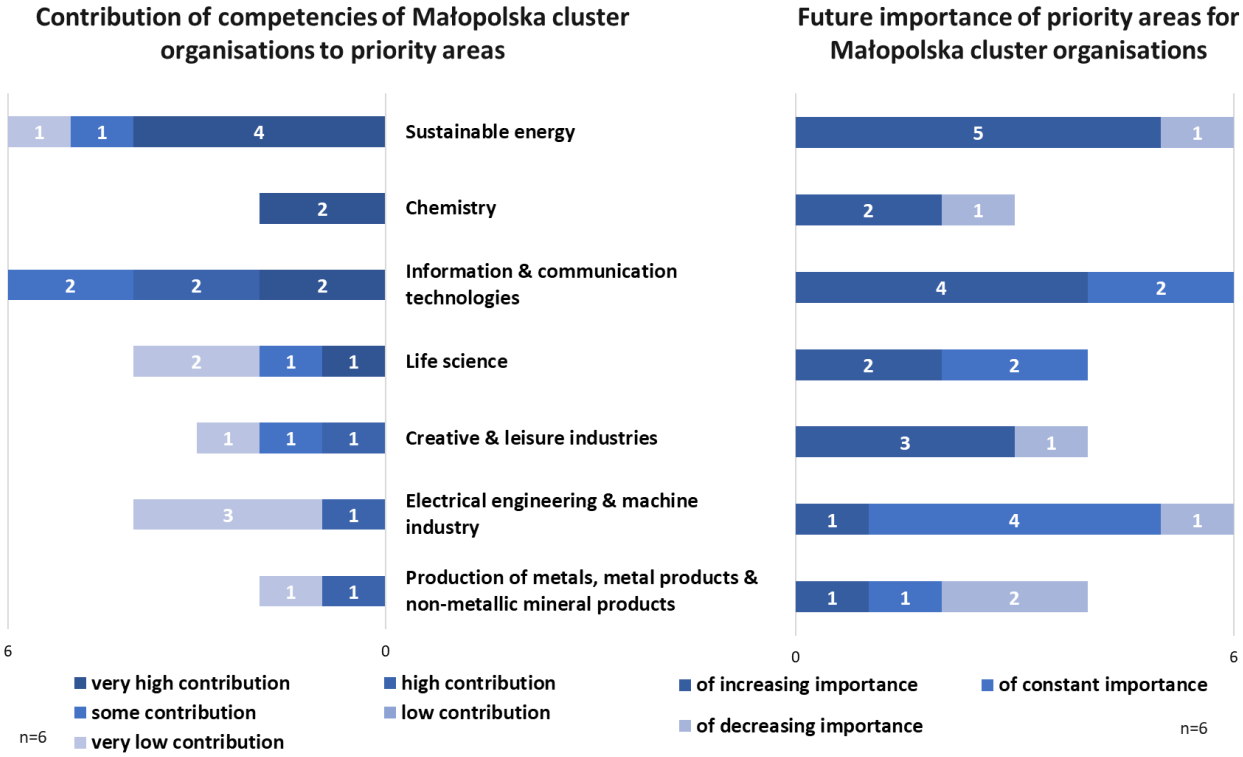
Lombardy - Technology clusters and biannual work programmes:
While priority areas are defined in a rather generic manner in the strategy, Lombardy has foreseen biannual Work Programmes that structure priorities into macro-themes and macro-themes into development themes. The establishment of these biannual work programmes is the result of a continuous Entrepreneurial Discovery Process (EDP) to identify more specific domains of the priorities. Thereby, especially technology cluster organisations played a crucial role in the S3 process and were involved in identifying areas for further development and the further refinement of the priority areas in biannual Work Programmes.

Slovenia - Strategic Research and Innovation Partnerships and the role of clusters (SRIPs):
In Slovenia, lasting partnerships between different types of stakeholders were created to implement the S3 through action plans. Cluster organisations can get involved in this process and these Strategic Research and Innovation Partnerships (SRIPs). There, priority areas are implemented through one SRIP per priority area and constitute long-term partnerships between different actors such as the business communities, research organisations, and the state.

Outlook: Competencies and involvement of cluster organisations in Małopolska in Smart Specialisation

Results of an online survey conducted with the cluster organisations in Małopolska show that they are contributing to all priority areas of the Regional Innovation Strategy of the Małopolska Region 2030. This can be regarded as an indicator for a functioning EDP as well as priority setting in the region. The priority areas related to "Sustainable energy" followed by "Chemistry" and "Information & communication technologies" are also priority areas where numerous cluster organisations report a high or very high contribution. This underlines the relevance of the Twin Transition for cluster organisations in Małopolska, and is also reflected in the future importance of the region's S3 priority areas. Here, cluster organisations stress the increasing importance of the priority areas "Sustainable energy" and "Information & communication technologies". Nonetheless, the majority of cluster organisations in Małopolska expect an increasing or at least constant importance of most priority areas in the future.

Figure 10: Results of survey - Priority areas of the S3 (2021-2027) of Małopolska

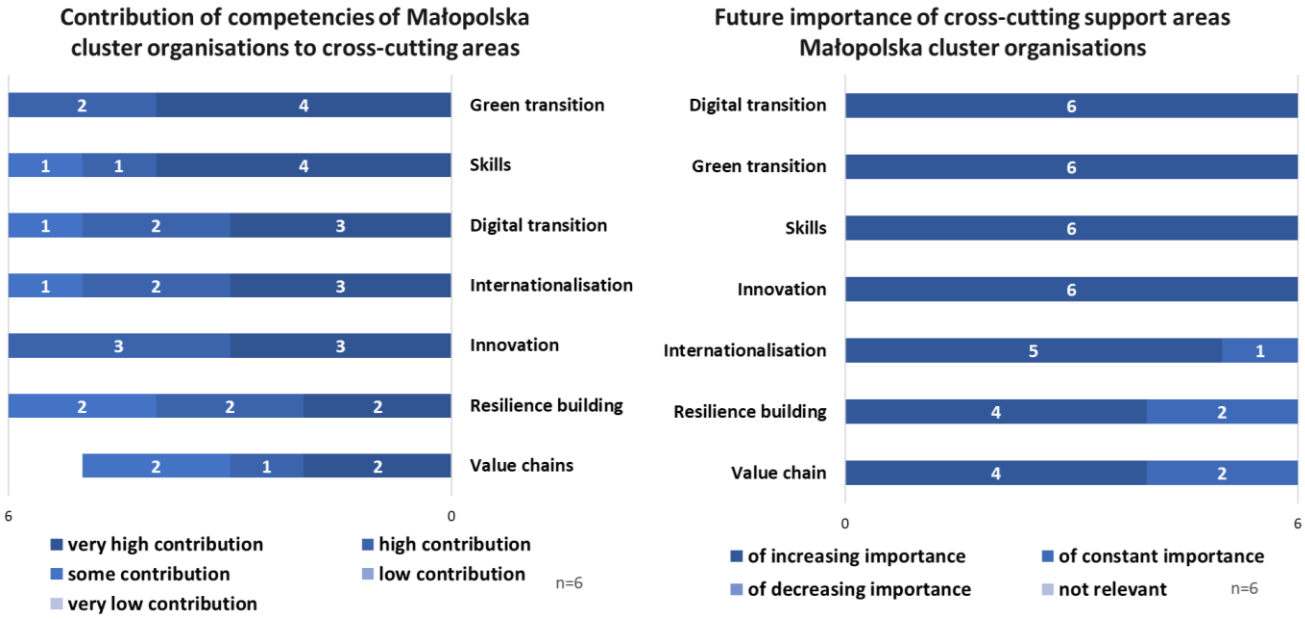


Source: ECCP (2023), results are based on the self-assessment of cluster organisations in Małopolska. Survey conducted in November 2023. Note: participants could select multiple priority areas.

Cross-cutting support areas and strategic challenges

Figure 11 shows the results of the survey concerning the cross-cutting support areas and strategic challenges of the region's cluster organisations. Here, the contributions to the areas of Green transition and skills, followed by Digital transition, Internationalisation and Innovation stand out. The previously underlined relevance of the Twin Transition is also reflected in the future importance of cross-cutting support areas for the region's cluster organisations. Here, almost all cluster organisations are seeing an increase in importance in the future. However, Innovation and Skills are also areas where the majority of the region's cluster organisations are reporting increasing importance in the future.

Figure 11: Survey results - Cross-cutting support areas and strategic challenges

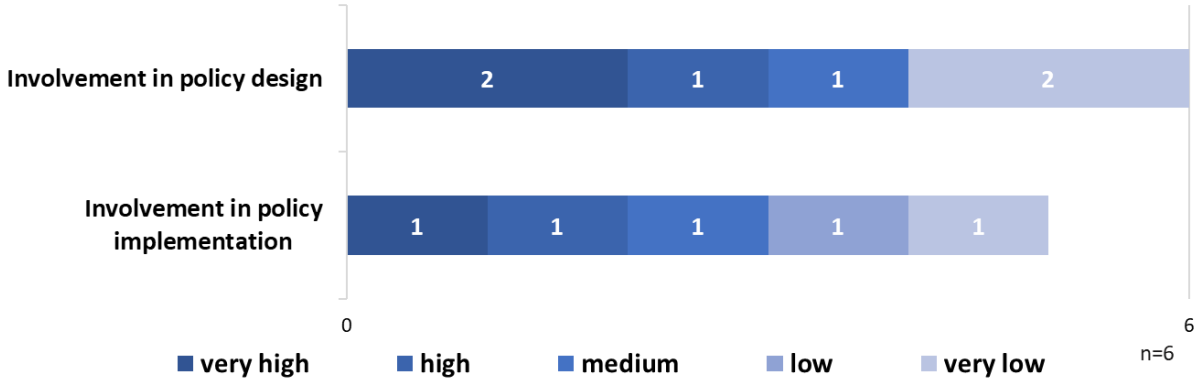


Source: ECCP (2023), results are based on the self-assessment of cluster organisations in Małopolska. Survey conducted in November 2023. Note: participants could select multiple priority areas.

Involvement of clusters in Małopolska in regional initiatives

Cluster organisations can be involved in regional initiatives such as regional economic governance, policy design and implementation at the regional level. For cluster organisation in Małopolska, the survey results show that these cluster organisations are generally involved in both the implementation and design of regional initiatives. Nonetheless, cluster organisations in Małopolska are slightly more intensely involved in policy design.

Figure 12: Results of survey - Level of involvement in regional initiatives of clusters in Małopolska in the 2021-2027 funding period



Source: ECCP (2023), results are based on the self-assessment of cluster organisations in Małopolska. Survey conducted in November 2023. Note: participants could select multiple priority areas.

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Annex

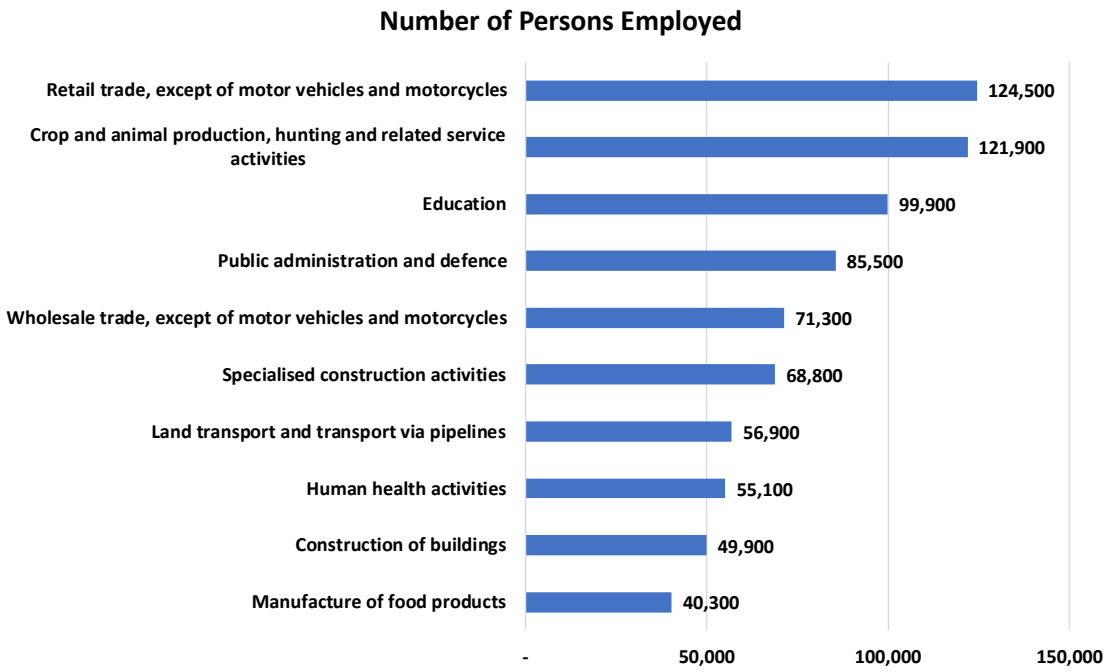
Employment Composition and Specialisation in Małopolska

Table 1: Share of employment in Małopolska, Poland and EU27

	Malopolskie (PL21)	Poland	EU27
Share of employment in:			
Agriculture & Mining (A-B)	9.2	10.3	4.4
Manufacturing (C)	17.5	20.1	16.4
Utilities & Construction (D-F)	12.2	10.2	8.3
Services (G-N)	56.4	52.9	63.7
Public administration (O-U)	4.7	6.5	7.2

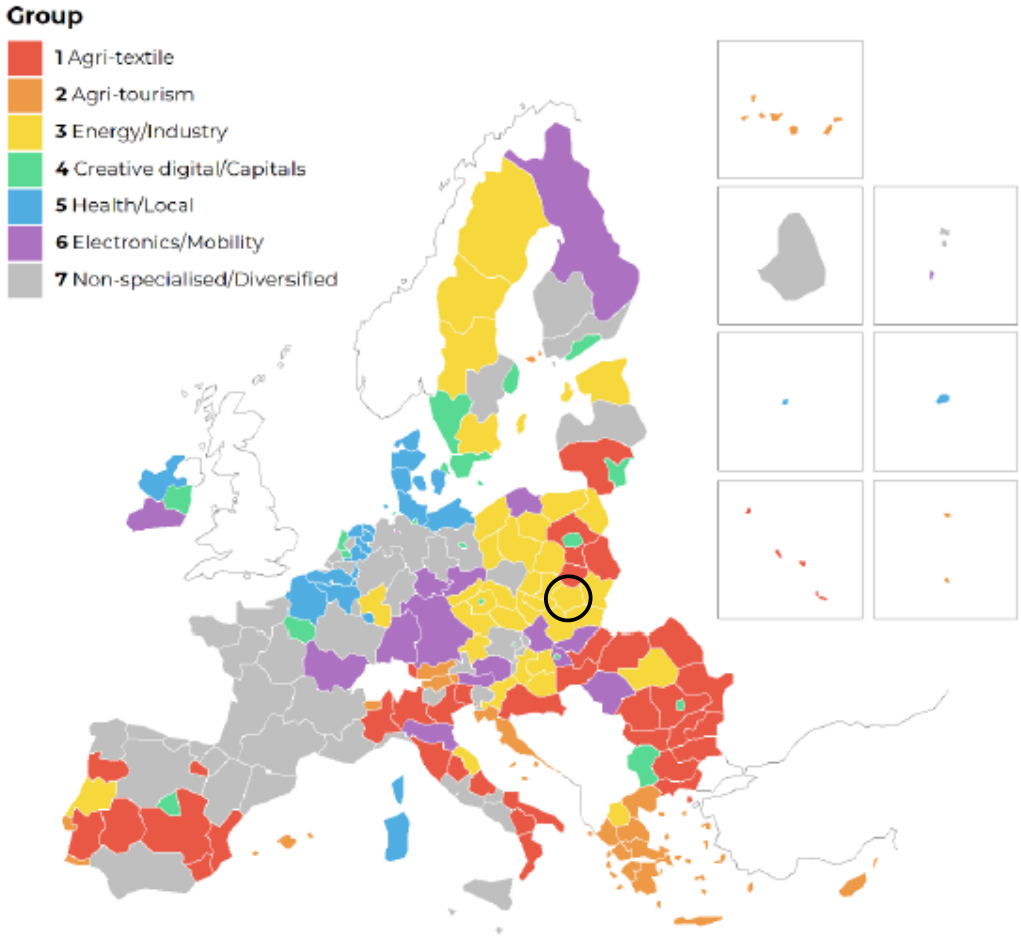
Source: ECCP (2023), own elaboration based on EU Commission (2023): Regional innovation Scoreboard 2023 – Regional profiles Poland.

Figure 13: Top 10 sectors by employment in Małopolska (in 2020)



Source: ECCP (2023), own elaboration based on data from Eurostat.

Figure 14: Regional typology based on industrial ecosystem specialisation



ECCP (2021): European Cluster Panorama.

Table 2: Number of regionally relevant sectoral nodes and Top 5 nodes by region (NACE)

Region	# of nodes	Node 1	Node 2	Node 3	Node 4	Node 5
PL21: Małopolska	8	C16 - Manufacture of wood and of products of wood and cork	C24 – Manufacture of basic metals	F41 – Construction of buildings	A01 - Crop and animal production, hunting and related service activities	F42 - Civil engineering

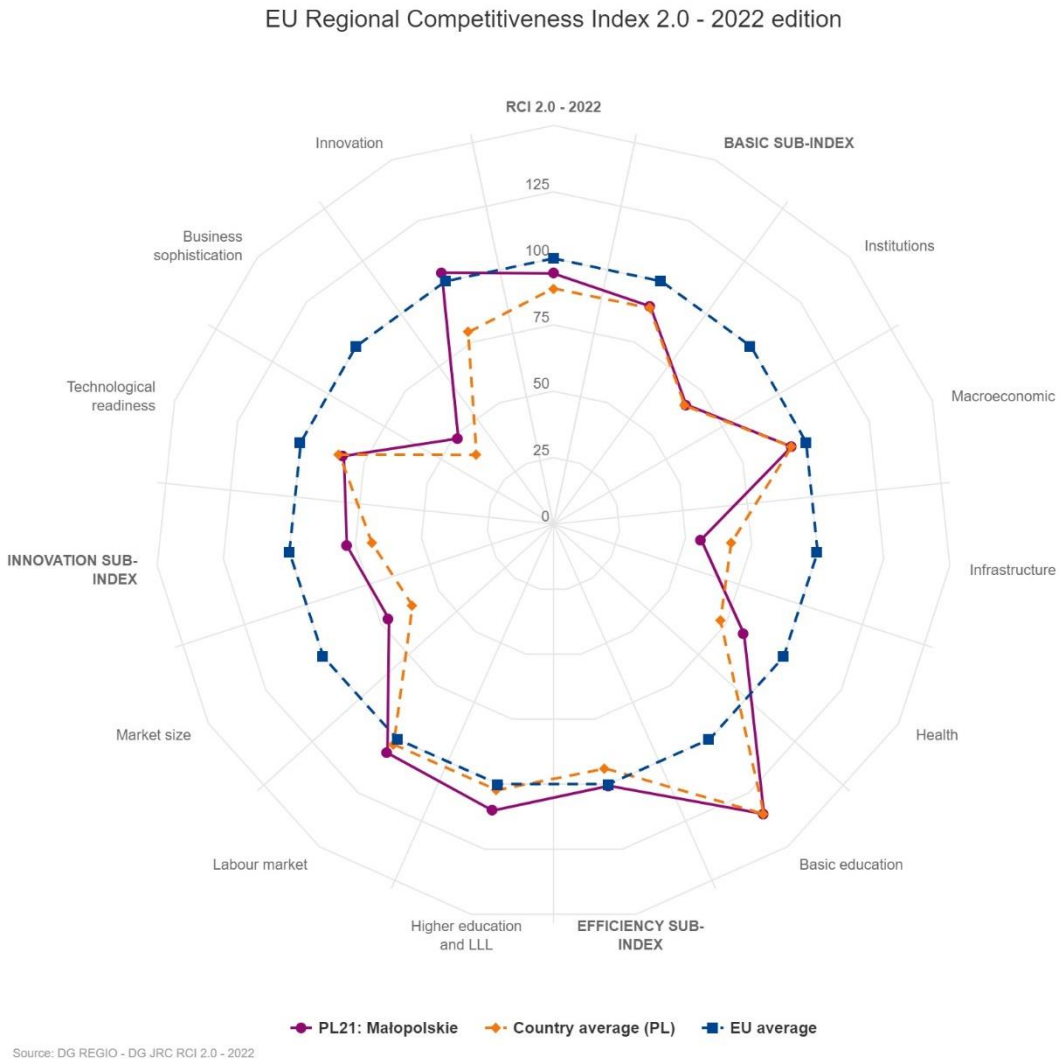
Source: ECCP (2023), own calculation and elaboration based on Eurostat data.

Table 3: Number of regionally relevant ecosystem nodes and Top 5 nodes by region (NACE)

Region	# of ecosystem nodes	Node 1	Node 2	Node 3	Node 4	Node 5
PL21: Małopolska	2	Agri-Food	Energy Intensive Industries	-	-	-

Source: ECCP (2023), own calculation and elaboration based on Eurostat data.

Figure 15: Performance of Małopolska in the 2022 Regional Competitiveness Index



Source: European Commission (2023): Regional Competitiveness Index 2.0 – 2022 edition. Available from https://ec.europa.eu/regional_policy/assets/regional-competitiveness/index.html#/PL/PL21 (last access 13.11.2023).

List of cluster organisations in Małopolska

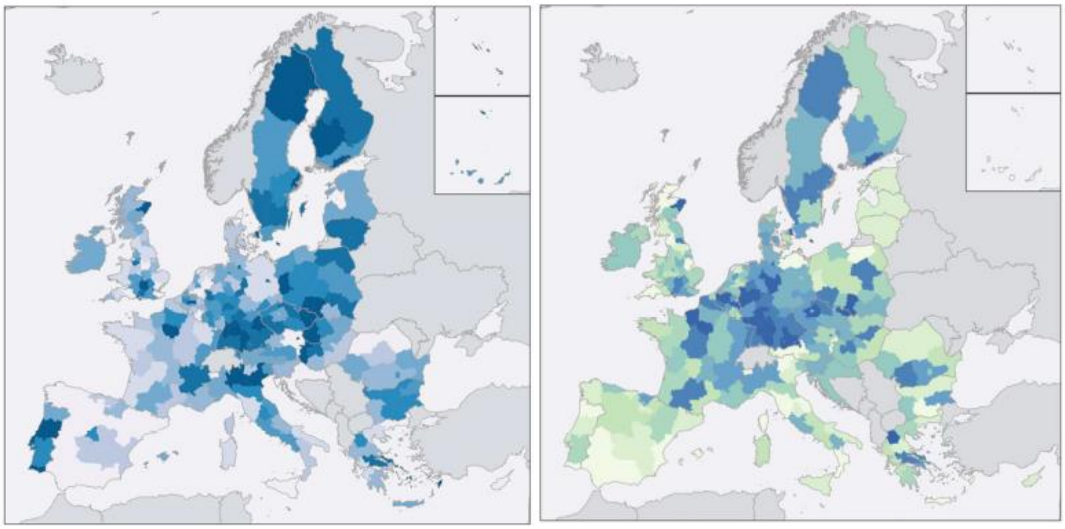
Table 4: Overview of cluster organisations in Małopolska and their addressed EU industrial ecosystems

N°	Cluster organisation	Industrial Ecosystem
1	**BIM Klaster**	Construction
2	**Intelligent Lighting Systems Cluster**	Construction
3	**Klaster LifeScience Krakow**	Health; Agri-food
4	**Polish Cluster of Composite Technologies**	Renewable Energy; Construction; Mobility-Transport-Automotive; Aerospace & Defence
5	**Software Development Association Poland**	Digital
6	**South Poland Cleantech Cluster**	Renewable Energy; Construction; Mobility-Transport-Automotive
7	**Sustainable Infrastructure Cluster**	Construction
8	**Polish Cybersecurity Cluster - #CyberMadeInPoland**	Digital

Source: ECCP (2023) and information provided by the Małopolska Regional Development Agency.

Indicators of cluster strength

Figure 16: Indicators of cluster strength: cluster portfolio strength (share of payroll accounted for by strong clusters) (left) and cluster mix (right)



Source: Ketels & Protsiv (2021): Cluster presence and economic performance: a new look based on European data. Note: Colours refer to deciles of the corresponding variables such that darker colours indicate higher values.

Overview of the industrial ecosystems

Figure 17: EU industrial ecosystems based on the European industrial strategy

14 industrial ecosystems are: aerospace and defence, agri-food, construction, cultural and creative industries, digital, electronics, energy intensive industries, energy-renewables, health, mobility – transport – automotive, proximity, social economy and civil security, retail, textile and tourism

Source: European Commission: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en (last access 19.04.2023).