EUROPEAN CLUSTER COLLABORATION PLATFORM

Clusters meet Regions' event "Clusters as key drivers of regional development and growth" – the case of Silesia

The new ECCP series of events "Clusters meet Regions"

Input paper to the event "Clusters as key drivers of regional development and growth" – the case of Silesia

An initiative of the European Union

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Executive summary

The following paper presents observations on the Silesia clusters' ecosystem 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 the Silesia region

- Traditionally an industry-oriented economy, Silesia is known for its mining industry that employs a significant part of its population. Recent trends in growing services sectors however signal more diversified economy. This could hand the region an advantage in developing diverse industries, whilst maintaining a competitive advantage in the mining sector
- Silesia is considered an "Emerging Innovator", according to the 2021 Regional Innovation Scoreboard. Interestingly, it performs above the national average in "Employment in Knowledge-intensive activities"

Clusters in the Silesia region and their importance for regional economic development

- With 11 active cluster organisations registered on the ECCP and a total of 22 cluster organisation in the region, Silesia is among the Polish regions with the highest number of cluster organisations.
- 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 Silesia.

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

- With one participation in the European Strategic Cluster Partnership initiative and one participation in the Eurocluster initiative, two Silesian cluster organisations are involved in cross-border projects with 9 partner organisations from seven EU Member States (BE, DE, EE, ES, FR, IT, NL).

From the S3 Strategy 2014-2020 to the S3 Strategy 2021-2027 of the Silesia region

- Both the 2014-2020 and 2021-2027 S3 Strategy address(ed) five priority areas in the fields of Energy, Green Economy, ICT, Medicine and Emerging Industries

01

Context: Economic profile of the Silesia region

1. Context: Economic profile of Silesia

This section will provide a short context about the socio-economic profile of Silesia region.

Silesia region productivity levels

The region of Silesia (Polish: Śląskie) is characterized by its high population (4.5 million) and high degree of urbanisation, with 78% of its population living in the city, which is further reflected with the region's economic focus on the industrial sector. Latest reports in 2017 indicated how the GDP of Silesia amounted to €57.2 billion making up 12.2% of Poland's national GDP[1]. As of 2021, the Regional Innovation Scoreboard notes how Silesia's overall output accounting for its number of people (GDP per capita) was recorded at 23.200, above the national average (22.700), yet below the EU average (31.200)[2]. Regarding the industrial sector, great deposits of natural resources and raw materials ranging from coal to lignite, zinc, lead, iron, and other ores in Silesia has contributed largely to the region's economy, thereby becoming a significant centre for mining and metalwork. Nevertheless, the well-developed cities (e.g. Katowice, Częstochowa) in combination with its universities network have contributed to newfound interest in business services focusing on IT[3].

When forming a picture of the economic characteristics of Silesia, it is vital to investigate how the various sectors impact the economy. Drawing from a recent report of the European Commission, job opportunities in industry and mining sectors appear to dominate, making up 28.1% of employment in 2017. This is reflected in the Regional Innovation Scoreboard report of 2021, in which the manufacturing sector accounts for 22.8% of employment in Silesia. Nevertheless, employment is otherwise dominated by services, occupying 52.9% of the working Silesian population, with utilities & construction as well as agriculture & mining following with an 9.5% and 8.5% share, respectively.

With coal mining playing a significant role to the Silesian economy, Polish government policies have largely aligned with this. Nevertheless, phase-out strategies and plans, as well as agreements with the European Commission have developed in recent years, pointing to a new stage in Poland's energy technology and industry sectors.

Silesia region sector specialisations and employment levels

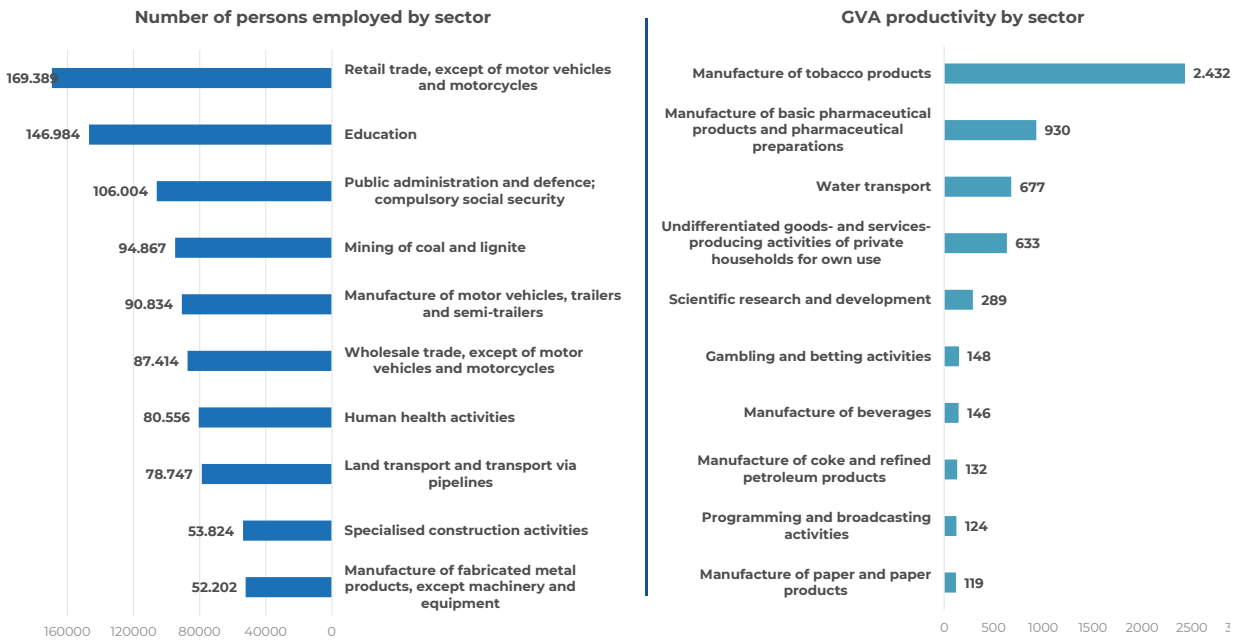
Figure 1 illustrates the top ten sectors by in which people are employed, with "Retail trade, except of motor vehicles and motorcycles", "Education" and "Public administration and defence; compulsory social security", "Mining of coal and lignite" and "Manufacture of motor vehicles, trailers and semi-trailers" ranked in the top five. The second graph in Figure 1, labelled "GVA Productivity by Sector", complements the former, as it presents the top ten sectors regarding gross value-added productivity by sector. An interesting statistic in this graph is that represented by "Manufacture of basic pharmaceutical products and pharmaceutical preparations", where 930 thousand Euro per full persons employed and relevant cluster structures is reported. This further aligns with Silesia's involvement in BioMan2R4, an Eurocluster initiative that focuses on innovation in biomanufacturing and medical products, which will be expounded on in greater detail in the third chapter.

[1] European Commission (2020). Silesia. Regional Profile. Initiative for Coal Regions in Transition. Available under: silesia_regional_profile_-_start_technical_assistance_0.pdf (europa.eu) (last accessed 10.10.2022).

[2] European Commission (2021). Poland. Regional Innovation Scoreboard. Available under: https://ec.europa.eu/docsroom/documents/45958 (last accessed 10.10.2022).

[3] Careers in Poland (2017). From heavy industry to IT in Silesia. Available under: From heavy industry to IT services - Silesia in Poland – News – Careers in Poland (last accessed 03.11.2022)

Figure 1: Top 10 sectors of employment and GVA productivity in Silesia, in 2018



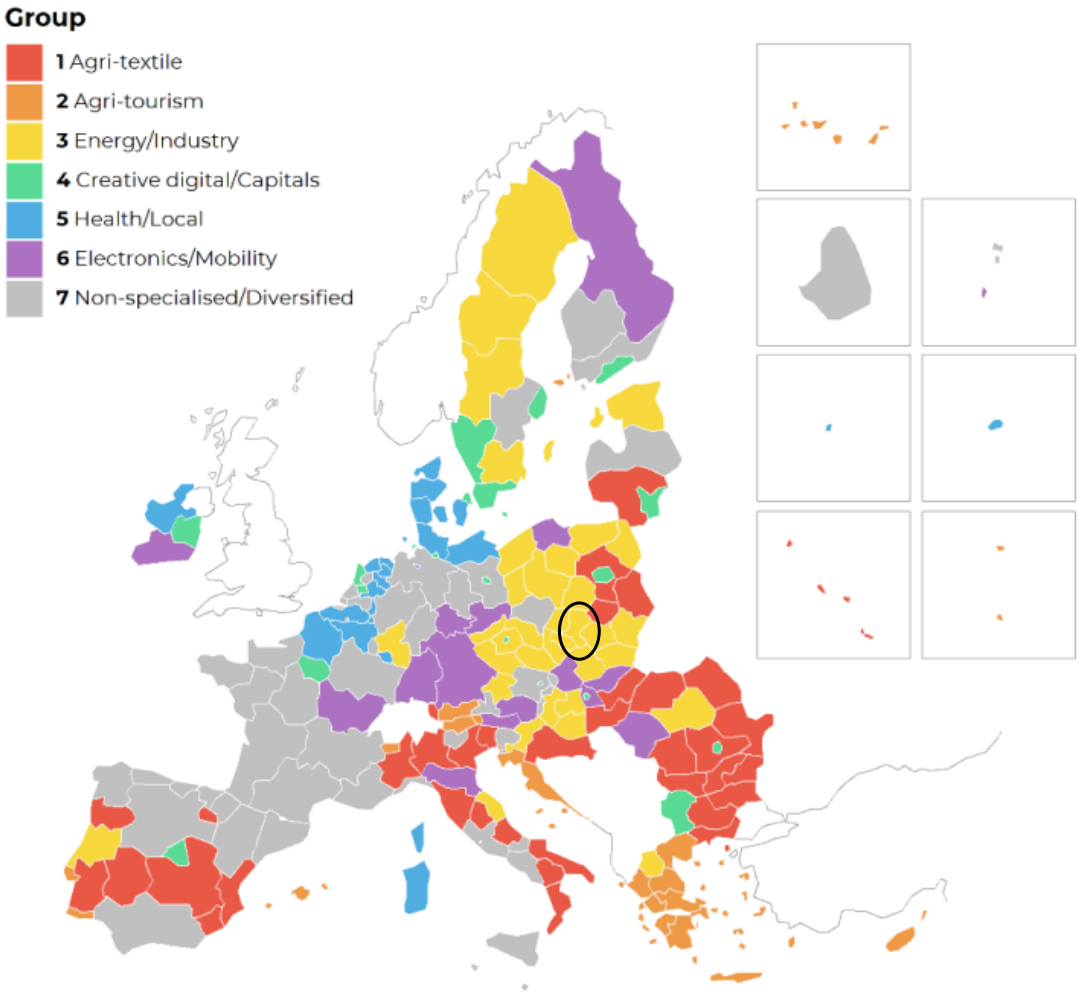
Source: ECCP (2022). Note: GVA productivity defined as k€/employee

In reference to the European Cluster Panorama report of 2021[4], specialisation patterns in different regions are visualised, to analyse cluster organisation presence based on particular typologies. As seen in the map below, Silesia can be classified as an **energy & industry economic region**. This could potentially hand the region an opportunity in gaining a competitive advantage in smart specialisations. Particularly in the realms of emerging and innovative industries, Silesia can integrate novel disciplines and cutting-edge industrial ecosystems where the foundation has already been set in the region. This is exemplified with the development of a growing and innovation-driven energy sector, which could build off the deep roots in the mining industry in Silesia. Furthermore, this overall aligns with the Silesian plans regarding the S3 Strategy 2021-2027, which will be discussed in the prospective chapter.

All in all, Silesia is a striking example of a region with great promise, where economic and cluster structures can foster regional growth potentials in the future.

[4] ECCP (2021). European Cluster Panorama 2021. Leveraging clusters for a resilient, green and digital regional economies. Available under: https://clustercollaboration.eu/sites/default/files/2021-12/European_Cluster_Panorama_Report_0.pdf (last accessed 11.10.2022).

Figure 2: Regional typology based on industrial ecosystem specialization



Source: European Cluster Panorama (2021).

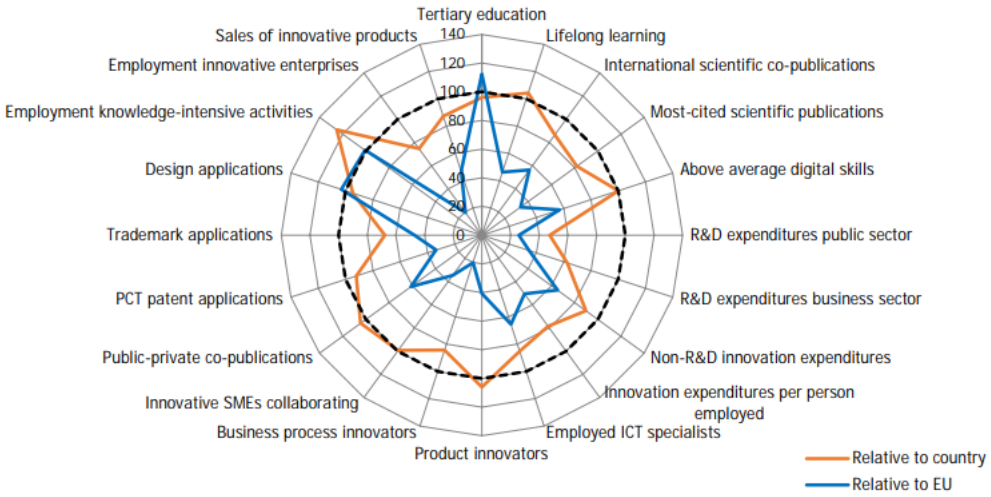
Regional innovation level of the Silesia region

In the course of this paper, we will investigate the economic performance of the Silesia region in the context of clusters and how these are organised. As a fundamental pillar, one can look at the level of innovativeness in Silesia with the Regional Innovation Scoreboard. The Regional Innovation Scoreboard measures how innovative a region is, based on indicators like "digital skills level"; "innovation expenditures" and "employment of ICT specialists"[5].

As seen in Figure 3, Silesia performs above the national and EU average in "Tertiary Education". This is mirrored in the report by the European Commission, in which it is stated that a mere 5.4% of the population between the age of 15 and 64 have lower secondary education, 64.8% have secondary education and tertiary education accounting for 29.7%. "Design applications" is also set above the national and EU average. While other indicators pertaining to "Knowledge-intensive activities", "Public-private co-publications", "Product innovators" and "Above average digital skills" rank marginally above the national average, only the former are on par with the EU-average.

[5] see European Commission (2021). Regional Innovation Scoreboard. Available under: https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/regional-innovation-scoreboard_en (last accessed 10.10.2022).

Figure 3: Innovation performance of the Silesia region in the Regional Innovation Scoreboard (2021)



Source: European Commission (2021): Regional Innovation Scoreboard 2021.

All in all, Silesia is considered an **"Emerging Innovator"** as its overall Regional Innovation Index score between 2014 and 2021 has increased by 12% (see in the Annex).

02

Clusters in Silesia region and their importance for regional economic development

2. Clusters in the Silesia region and their importance for regional economic development

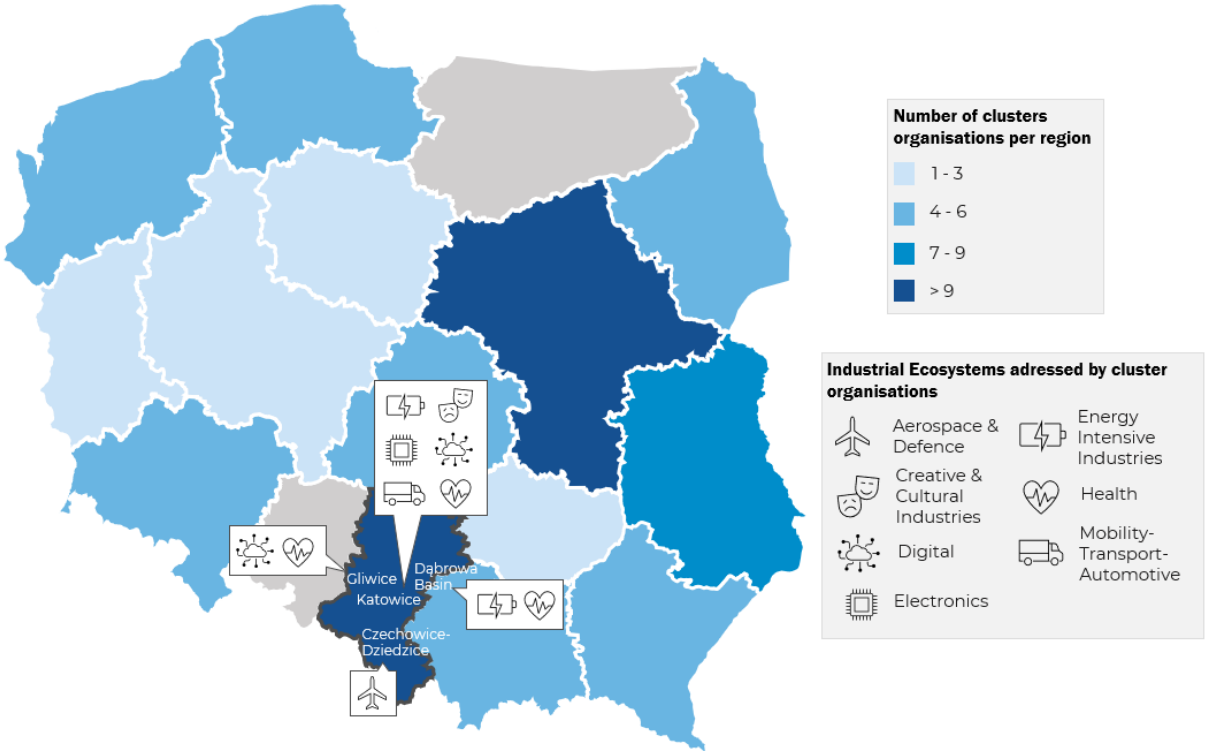
The involvement of clusters in regional economic governance, policy design and implementation at the regional level, is crucial. This chapter will provide an overview of the cluster landscape in Silesia and will aim to describe their activity at the regional level within its governance and policy.

Clusters in the Silesia region

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 Silesia on the ECCP gives the first impression on the intensity of cross-border activities and cooperation of Silesian clusters in European networks. Out of the around 1,400 registered EU-27 cluster organisations on the ECCP, there are **11 cluster organisations from Silesia.**

Figure 4 displays the geographical distribution of the cluster organisations in the region: a large part of the Silesian cluster organisations is situated in Katowice (5). Most of the others are in the surrounding metropolitan area, namely in Gliwice (2), Ruda Śląska (1), as well as Czeladź (1) and Dąbrowa Górnicza (1) in the Dąbrowa Basin. Only one cluster organisation is situated outside this Upper-Silesian-Dabrowian metropolitan area in the Kaniów suburb of Czechowice-Dziedzice, in the South. Hosting the largest urban agglomeration in Poland next to the Warsaw metropolitan area, the region is also home to the second largest number of cluster organisations (11), coming close to the capital (12). Three Silesian cluster organisations have the status of Key National Clusters, on par with the neighbouring Małopolskie region and outperforming the capital region.

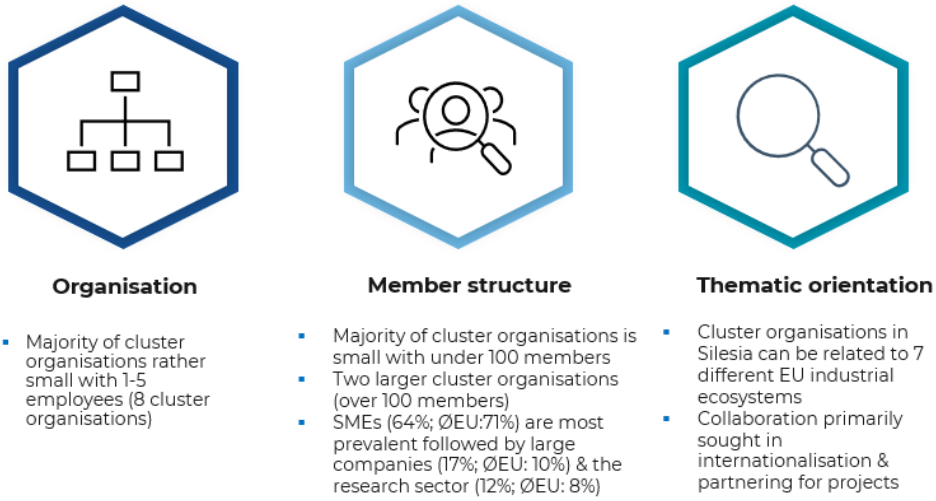
Figure 4: Overview of registered cluster organisations in Poland as well as regional and sectoral distribution of active cluster organisations in Silesia



Source: ECCP (2022). Own elaboration based on https://reporting.clustercollaboration.eu/all; last accessed 28.09.2022. A full overview of the Silesian clusters is provided in Table 2 in the Annex.

The cluster organisations in Silesia can be related to **eight out of 14 different EU industrial ecosystems**[6] (see also Table 2 in the Annex). The ECCP data presented in the map above is complemented with information provided from the regional authorities[7] and includes 11 cluster organisations that are currently not registered on the ECCP. The EU Industrial Ecosystems that are the most addressed by Silesian cluster organisations registered on the ECCP are Energy Intensive Industries, Mobility-Transport-Automotive, and Health. Silesia's Key National Clusters are operating in medical technology (MedSilesia, Gliwice), the automotive sector (Silesia Automotive & Advanced Manufacturing, Katowice) and the aviation industry (Silesian Aviation Cluster, Kaniów).[8]

Figure 5: Overview of organization, structure, and thematic orientation of cluster organisations registered on the ECCP in Silesia



Source: ECCP (2022).

Similar to the majority of European cluster organisations registered on the ECCP cluster organisations in Silesia are rather small.[9] The majority of the Silesian cluster organisations have between 1-5 employees and less than 100 members, with the majority of them having between 50-100 members while only two are below 30 members. There are two larger cluster organisations with more than 100 members, namely 'MedSilesia - The Silesian Network of Medical Devices' in Gliwice with 113 members and 'Silesia Automotive & Advanced Manufacturing' in Katowice with 170 members. SMEs account for most of the members of Silesian cluster organisations (64%), followed by large companies (17%) and

[6] see European Industrial Strategy. Available under: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en (last accessed 08.02.2022).
[7] see Invest in Silesia: Clusters. Available under: https://invest-in-silesia.pl/content/clusters_EN (last accessed 04.10.2022).
[8] For more information on clusters in Silesia see the Polish Cluster Benchmarking Report 2020. PARP (2021): Benchmarking klastrów w Polsce – edycja 2020. Raport ogólny. Available under: https://www.parp.gov.pl/component/publications/publication/benchmarking-klastrow-w-polsce-edycja-2020 (last accessed 10.10.2022) as well as the Regional Innovation Strategy of the Silesian Voivodeship 2030. Available under: https://ris.slaskie.pl/dokument/regionalna_strategia_innowacji_wojewodztwa_slaskiego_2030 (last accessed 13.10.2022) and the Technology Development Program of the Silesian Voivodeship for the years 2019 – 2030. Available under: https://ris.slaskie.pl/dokument/program_rozwoju_technologii_wojewodztwa_slaskiego_na_lata_2019__2030 (last accessed 13.10.2022).
[9] see ECCP (2021): European Cluster Panorama Report 2021. Available under: https://clustercollaboration.eu/sites/default/files/2021-12/European_Cluster_Panorama_Report_0.pdf (last accessed 28.09.2022).

the research sector (12%). Compared to the EU average, both large companies (EU: 10%) and the research sector (EU: 8%) are significantly more prevalent in the membership of Silesian cluster organisations, while SMEs make up for a smaller part (EU: 71%). Silesian cluster organisations seek collaboration primarily in the areas of internationalisation and partnering for projects.

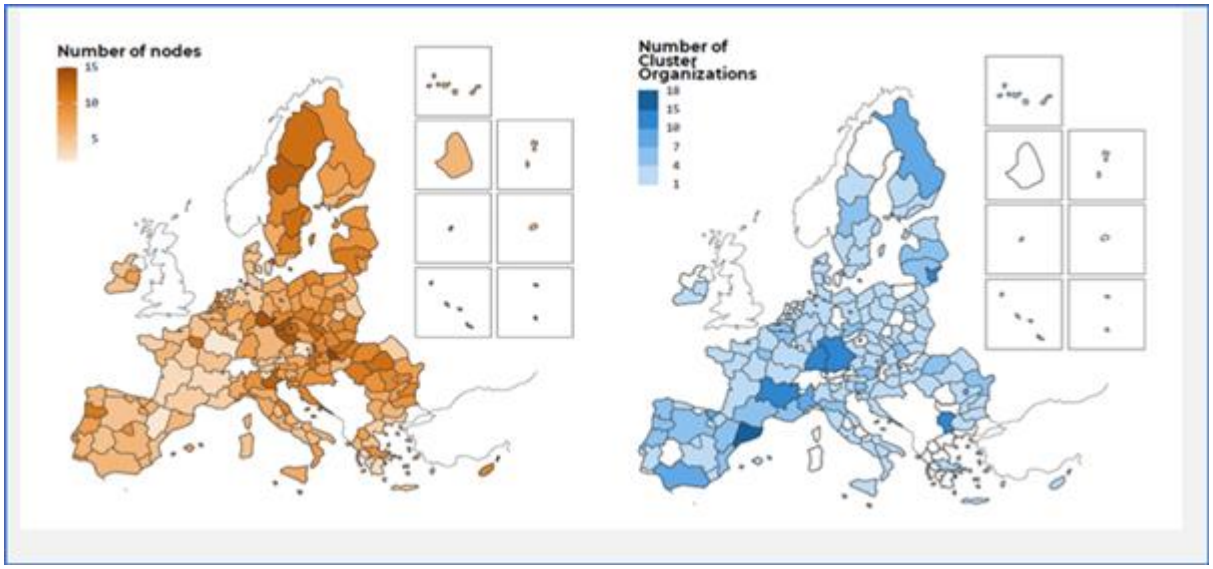
Moreover, three of the cluster organisations from the region have obtained the Cluster Excellence Label – one Gold Label, one Silver Label, and one Bronze Label. Others have received national or regional labels and rewards such as the Marka Śląskie 2017 (Silesian Trademark Award 2017).

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 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[10], it does indicate how specific regions could earn greater public support, when specific industries pertain to a local significance. Particularly indicators pertaining to R&D expenditures are key in measuring economic performance concerning innovation.

In Figure 6 as seen below, one can see how Silesian clusters have an average number of region-relevant specialisation nodes[11], as well as an average number of cluster organisations, in comparison to other European regions.

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



Source: European Cluster Panorama (2021).

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

[10] 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%).
[11] 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%).

example, Ketels & Protsiv (2021)[12] 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 has 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". A visual depiction that highlights this trend can be seen in the map of Ketels in the Annex.

In the context of Silesia, the statistical data and analysis of Ketels & Protsiv (2021) suggest how the cluster portfolio strength, as well as its cluster mix, are significantly more developed than in other Polish and even European regions. The results are presented visually in the Annex.

Regarding the **Polish cluster policy** in general, Kuberska and Mackiewicz (2022)[13] emphasize the benefits of platforms for cooperation between clusters at the regional as well as the Key National 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 were 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[14] 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 behind when it comes to collaborations between businesses and academic and other research institutions. The country report[15] 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 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 if Polish clusters' increasingly transnational networks can also reinvigorate their comparatively weakly developed local collaborations.

As Poland's leading industrial region, **Silesia** was able to form and sustain a large number of cluster organisations and supports cluster development through its development strategy 'Śląskie 2030'.[16] Yet, although the region makes up for 14,3 per cent of Poland's industrial production – more than any other Polish region – , it is lagging behind in terms of R&D expenditure with only 7,3 per cent.[17] This points to the conclusion, that Silesia's clusters are already doing quite well in organising production

[12] 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 at: https://www.tandfonline.com/doi/full/10.1080/00343404.2020.1792435 (last accessed 29.09.2022).

[13] 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 accessed 04.10.2022).

[14] 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 accessed 20.10.2022).

[15] 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 accessed 20.10.2022).

[16] Board of the Silesian Voivodeship. Development Strategy of the Silesian Voivodeship "Śląskie 2030". Available under: https://www.slaskie.pl/content/strategia-rozwoju-wojewodztwa-slaskiego-slaskie-2030 (last accessed 04.10.2022).

[17] For context: Silesia is home to about 11,6 per cent of the Polish population. See Statistics Poland (2022): Regions of Poland 2022. Available under: https://stat.gov.pl/en/topics/other-studies/cities-voivodship/regions-of-poland-2022,5,16.html (last accessed 04.10.2022), pp. 6, 38 & 40.

networks but at the same time, there remains a lot of untapped potential when it comes to innovation activities. The country report on Poland's business-research collaboration offers a positive outlook on Silesia's innovation capacity as the region consistently ranks among the country's top 3 across indicators[18].

In conclusion, both the EU Cluster Panorama Report (2021) and Ketels & Protsiv (2021) in general, and Kuberska & Mackiewicz (2022) as well as Grzybowska-Brzezińska et al. (2022) in particular make the case for cluster organisations as a proven method to stimulate long-term growth and innovative activity on a regional level. Already offering one of the densest business environments in Poland and a range of well-established industrial clusters, the region of Silesia is set to continue its path and leverage its innovation and growth potentials through successful cluster development.

[18] 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 accessed 20.10.2022), pp. 9ff.

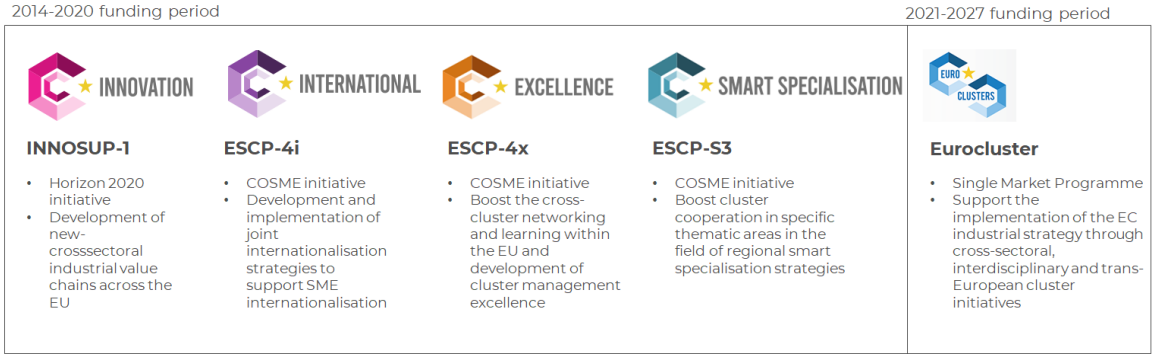
03

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

3. Cross-border cooperation and the involvement of Silesian clusters 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 highly relevant activity for clusters to support sustainable growth and resilience building of their SME members.[19] To gain an overview of the existing cross-border cooperation of Silesian clusters, a closer look will be taken in this chapter on the involvement of Silesian clusters 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 funding period.[20] (see Figure 7)

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



Source: ECCP (2022)

Involvement of Silesian clusters in European Strategic Cluster Partnerships (ESCP)

In the 2014-2020 funding period, the Silesian Network of Medical Devices was the only Silesian organisation that participated in a cross-regional EU support initiative. The MedSilesia network participated with partners from France (Lyonbiopole), Germany (BioRegio), Belgium (BioWin) and Italy (BioPmed) in the S3martMED, a European Strategic Cluster Partnership (ESCP) with the focus on smart specialisation (ESCP for Smart Specialisation).[21] The S3martMed project's objective were to boost interregional cooperation with regards to medical technologies. The project lasted from October 2018 until September 2020. The total EU contribution to the project was EUR 348.340.[22]

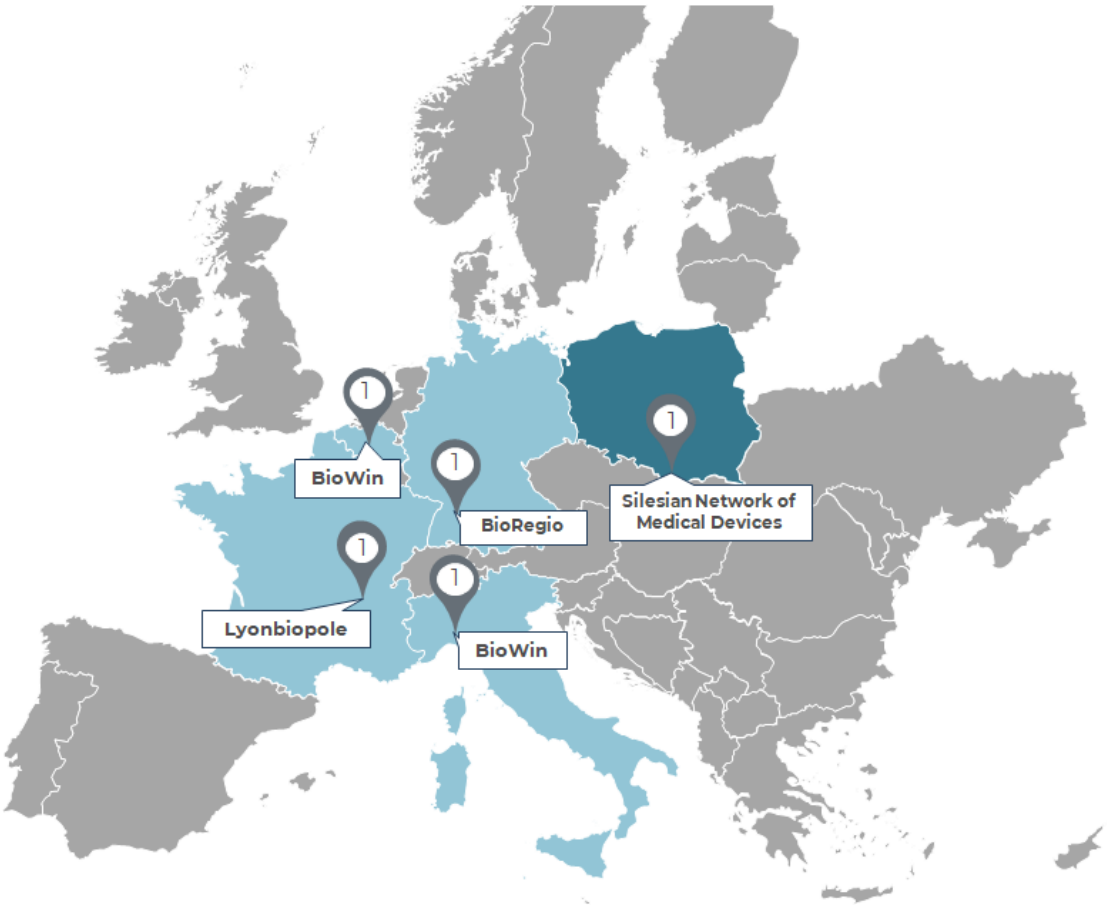
[19] Prognos et al. (2021): Evaluation Study of & Potential Follow-Up to Cluster Initiatives under COSME, H2020 & FPI (DG GROW, Unit D2 - Industrial Forum, alliances, clusters). Study on behalf of the European Commission. Available under: https://op.europa.eu/en/publication-detail/-/publication/a2c3e9e1-3deb-11ec-89db-01aa75ed71a1/language-en/format-PDF/source-241039860 (last access on 31.01.2022).

[20] For more information on the Euroclusters see: https://eismea.ec.europa.eu/funding-opportunities/calls-proposals/joint-cluster-initiatives-euroclusters-europes-recovery_en (last access on 18.10.2022).

[21] For more information on the European Cluster Partnerships see: https://clustercollaboration.eu/eu-cluster-partnerships (last access 07.02.2022).

[22] For more information to the S3martMed project see: https://clustercollaboration.eu/content/s3martmed (last access on 10.10.2022).

Figure 8: Overview of project consortium of ESCP-S3 "S3martMed"



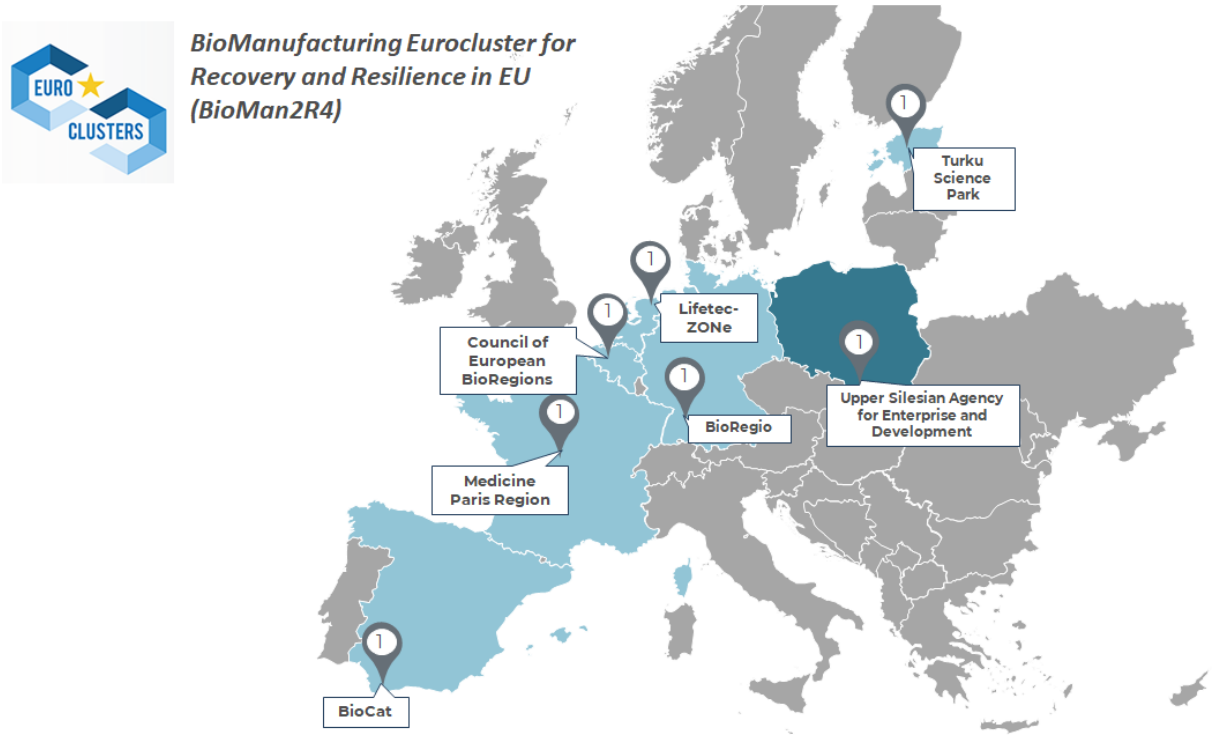
Source: ECCP (2022), based on information from COSME data hub (last access on 10.10.2022) and Funding & Tender Portal.

Involvement in the Joint Cluster Initiatives (Eurocluster) for Europe's recovery

With regards to the 2021-2027, the European Commission has launched the implementation of the EU Industrial Strategy. In this context, so-called Euroclusters are funded under the Single Market Programme. The Eurocluster initiative aims at supporting cross-sectoral, cross-regional European industry clusters cooperating with other economic stakeholders such as companies or business organisations.[23]

[23] For more information to the Eurocluster call see: https://clustercollaboration.eu/euroclusters (last access 11.10.2022).

Figure 9: Overview of project consortium of project consortium of Eurocluster "BioMan2R4"



Source: ECCP (2022), based on information from Funding & Tender Portal.

From Silesia, one organisation is participating in the *BioManufacturing Eurocluster for Recovery and Resilience in EU (BioMan2R4).*[24] The Upper Silesian Agency for Enterprise and Development sp. cooperates within the consortium together with organisations from Estonia (Turku Science Park), Spain (Biocat), Germany (Bioregio), the Netherlands (LifetecZONe), France (Medicine Paris Region) and the Council of European BioRegions (CEBR). The objectives of the Eurocluster *BioMan2R4* are to adapt funding needs of the health sector to facilitate the scaling up of innovation of biomanufacturing and medical products and to enable an EU-wide long-term collaboration between SMEs, investors and other relevant stakeholders.

[24] For more informationen to the Eurocluster BioMan2R4 see: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/how-to-participate/org-details/999999999/project/101074495/program/43252476/details (last access 11.10.2022).

04

From the S3 Strategy 2014-2020 to the S3 Strategy 2021-2027 of the Silesian region

4. From the S3 Strategy 2014-2020 to the S3 Strategy 2021-2027 of the Silesian region

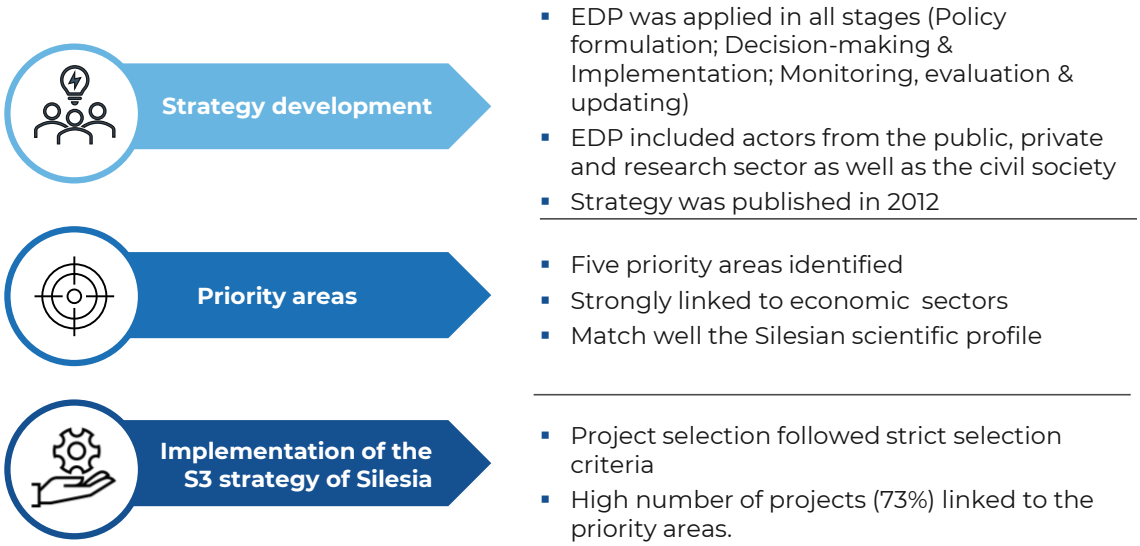
Cluster organisations (can) play an important role in the design and implementation of smart specialisation strategies since in both concepts, the facilitation of economic growth and competitiveness through regional proximity, are key elements. Hence, this chapter focuses on the Silesian S3 Strategy 2014-2020 and the new S3 Strategy of the Silesian region.

S3 Strategy 2014-2020 of Silesia

The Silesian S3 Strategy 2014-2020 was published in 2012 and set the framework for the concentration of resources to dedicated research and development as well as innovation priority areas. Figure 10 provides a quick overview of the key facts about the Silesian S3 Strategy 2014-2020 and will be presented in more detail in the following.

A key starting point for the analysis of the Silesian S3 Strategy 2014-2020[25] is the data collected in the Study on prioritisation in Smart Specialisation Strategies in the EU.[26] This study systematically screened and assessed all available S3 strategies across the EU to discover the respective approaches to prioritisation, to analyse if priorities set within the strategies correspond to innovation capabilities and if these were translated into concrete projects. The following analyses will follow the logic of an 'ideal' S3 process (from strategy development to implementation of projects).

Figure 10: Factsheet – Silesian S3 Strategy 2014-2020



Source: ECCP (2022)

[25] see also the Operational Programme of Silesia. Available under https://ec.europa.eu/regional_policy/en/atlas/programmes/2007-2013/poland/operational-programme-silesia (last access on 21.09.2022)

[26] Prognos /CSIL (2021): Study on prioritisation in Smart Specialisation Strategies in the EU. Study on behalf of the European Commission. Available under: https://ec.europa.eu/regional_policy/en/information/publications/studies/2021/study-on-prioritisation-in-smart-specialisation-strategies-in-the-eu (last access on 31.01.2022)

Strategy development

Regarding the Entrepreneurial Discovery Process[27] (EDP) it can be stated that in Silesia the EDP was applied in all stages of policy formulation. This includes the three stages Policy formulation, Decision-making & Implementation as well as Monitoring, evaluation & updating. The EDP that was applied in these stages of policy formulation included a broad range of actors covering the public, private, and research sectors as well as the civil society. Box 1 shows some good practices of cluster involvement in S3 strategies from other European regions and especially in the EDP.

Priority areas

The five priority areas that were identified in the Silesian S3 Strategy 2014-2020 are presented below. A full overview and the respective sub-priorities are displayed in Table 3 in the Annex.

Figure 11: Priority areas of the Silesian S3 Strategy 2014-2020

The Silesian Strategy 2014-2020 is strongly linked to economic sectors (64%), scientific fields (64%) and to a lesser extent also to technological fields (52%). This means that similar to many other S3 strategies the priorities of the Silesian S3 Strategy 2014-2020 are not solely economically, scientifically, or technologically driven but rather reflect a combined approach. In addition, when it comes to its thematic focus (measured with a Bandwidth Index[28]) the Silesian S3 Strategy 2014-2020 is characterised by a medium-narrow thematic bandwidth (27%; EU average: 36%).

Regarding the correspondence of the Silesian S3 Strategy 2014-2020 with its regional profile and regional innovation capabilities, it can be stated that the Silesian strategy matches best the scientific profile. This means that there is a relatively strong and positive correspondence between the S3 priority areas mentioned above and the average publication share in the three years before the strategy implementation.

Implementation of the S3 strategy of Silesia

Considering the implementation of the Silesian S3 Strategy 2014-2020 it is found that overall, the project selection followed strict selection criteria as the projects needed an alignment to the S3 priority areas mentioned above. These strict selection criteria are also reflected in the high number of projects and to a lesser extent to the budget that is linked to the priority areas

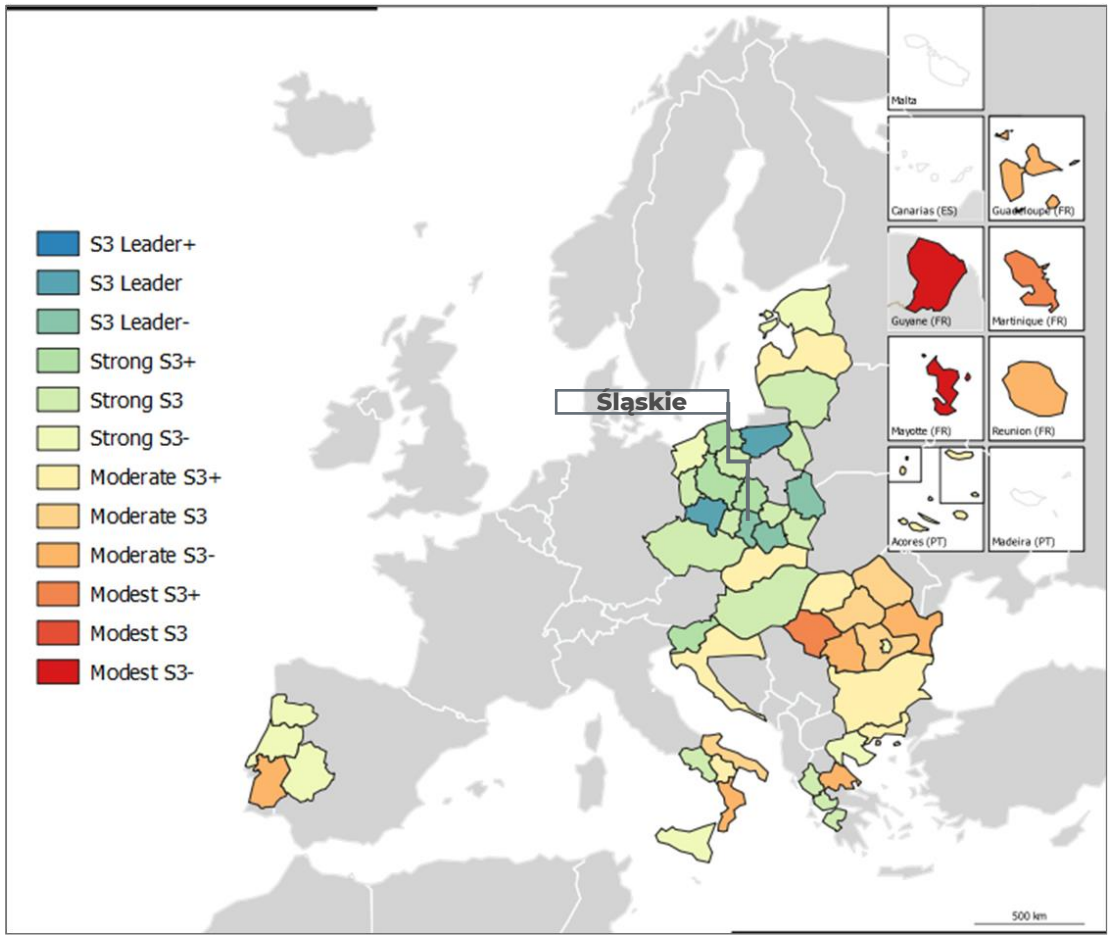
[27] The entrepreneurial discovery is an interactive and inclusive process in which the relevant actors identify new and potential activities and inform the government. The government assess this information and empowers those actors most capable of realising the potential. See https://s3platform.jrc.ec.europa.eu/edp (last access on 31.01.2022)

[28] The index of bandwidth indicates the thematic broadness that a S3 strategy covers. It is measured by the degree to which the strategy targets all the possible economic sectors, scientific and technological fields. If a strategy is "narrowly" defined (lower index) it means that it picked only a few economic sectors, scientific and technological fields. A "broadly" defined strategy (higher index) indicates that it focuses on many economic sectors, scientific and technological fields.

of the Silesian S3 Strategy 2014-2020. Overall, around 73 % of the ERDF-TO1 projects and 50% of the ERDF-TO1 project budget between 2014-2020 are connected to the S3 priorities. Among all 185 S3 strategies on average 57% of the projects are connected to the priority areas and 62% of the budget.

As a concluding remark on the Silesian S3 Strategy 2014-2020, an S3 Scoreboard for Less Developed Regions is presented (Figure 12). This Scoreboard serves as a comparative assessment of all 185 smart specialisation strategies in EU Member States and regions. This reflects many of the analytical steps shown before and ranks the regional S3 strategies based on their performance relative to their group average. These groups follow the Cohesion Region classification from the European Commission and are based on economic development.[29] In this Scoreboard Silesia is classified as a 'S3 Leader-', meaning that it performs above the group average.

Figure 12: Silesia in the S3 Scoreboard 2021 (Less Developed Regions)



Source: ECCP (2022), own elaboration based on Prognos / CSIL (2021).

[29] For more information on the Cohesion Regions see: https://ec.europa.eu/eurostat/web/cohesion-policy-indicators/context/cohesion-regions (last accessed 03.02.2022)

Box 1: Good practices of cluster involvement in S3 strategies

Good practices of cluster involvement in S3 strategies

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 definition 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.

Source: ECCP (2022), based on Case Studies conducted in the context of the Study on prioritisation in Smart Specialisation Strategies in the EU (Prognos / CSIL 2021).

S3 Strategy 2021-2027 of the Silesia region

The Silesian Smart Specialisation Strategy (S3) for the period 2021-2027 essentially builds upon the smart specialisation strategy of the 2014-2020 period. Figure 13 shows the priority areas for the Silesian S3 Strategy for 2021-2027 and it emerges that these priority areas are quite similar to the Silesian Strategy of the 2014-2020 period. This strategy covers the five priority areas presented below.

Figure 13: Priority areas of the S3 frameworks for 2021-2027 (draft version as of October 2022)

Source: Śląskie Region (no date): Regionalna Strategia Innowacji Województwa Śląskiego 2030

Energy sector
According to the regional innovation strategy of Silesia this priority area reflects the goals of the European Green Deal as well as the National Energy and Climate Plan 2021-2030 of Poland. In this regard the transformation of Silesia as a coal and mining region is mentioned. Underlying fields of this priority area that are underlined in the Silesian innovation strategy circle around energy efficiency in industry, energy-efficient construction, renewable energy generation as well as electro mobility.

Health & Medical sectors
The regional innovation strategy of Silesia highlights the strength in these sectors and refers to a number of renowned medical and specialist units as well as SMEs that are present in the region. Biotechnology, nanotechnology, advanced materials, 3D printing/bio-printing as well as medical ICT are underlying fields of this specialisation area.

Green Economy
Similar to the priority area "Energy Sector" this priority is linked to the European Green Deal in the regional innovation strategy of Silesia. In this regard the implementation of innovative, low-carbon, resource-efficient solutions are outlined but also the cross-cutting nature of ICT (e.g., big data) is listed as relevant for the green economy of Silesia.

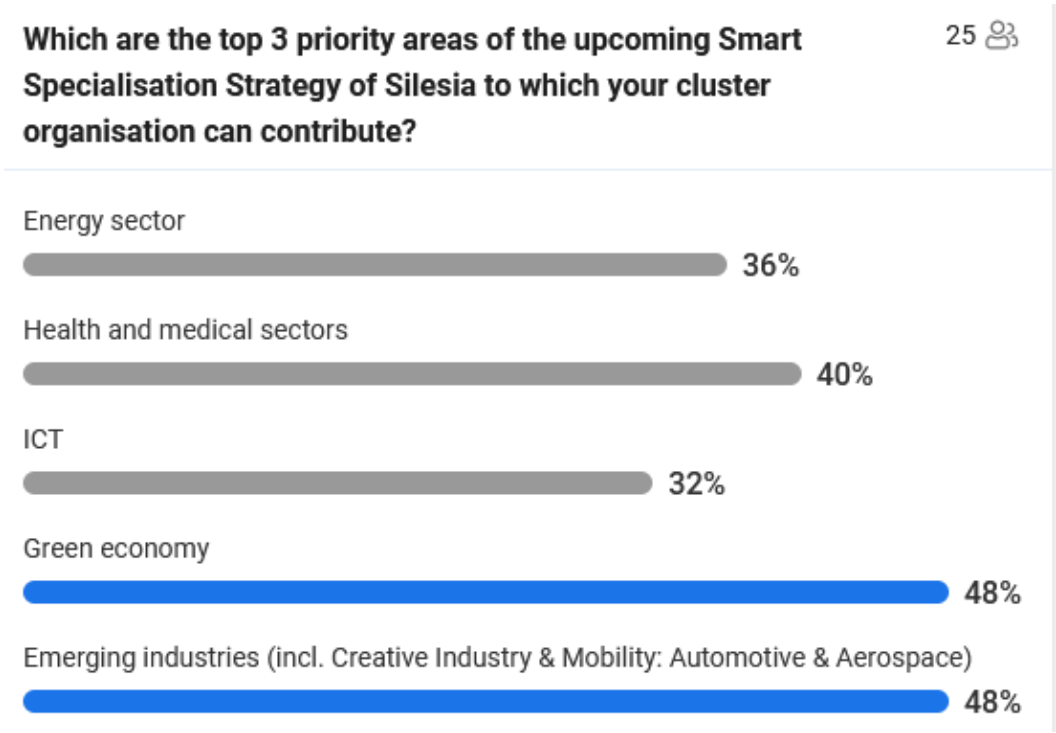
ICT
The relevance of Silesian ICT companies for the national Polish business structure in this regard is highlighted in the regional innovation strategy of Silesia. Thereby, artificial intelligence, Internet of Things, software as well as telecommunication providers are specifically mentioned in this regard. For the period post 2021 Silesia addresses the importance of communication technologies such as 5G and quantum computing to be in the focus but also blockchain is mentioned as an underlying topic of this priority area.

Emerging Industries
The regional innovation strategy of Silesia defines emerging industries as new or existing economic sectors and value chains that are developing into new industries and are relevant for the development of the region. The emerging industries that are identified are Creative

industries which include industries related to the creation, production and/or distribution of creative goods and services and the integration of creative elements into wider processes and other sectors. The other emerging industry focuses on mobility and especially emphasises the entire automotive and aerospace value chain.

The following figure shows the results of an online voting that was conducted during the Clusters meet Regions' event in Silesia between 7th and 8th November 2022. Here, participants were asked which are the top 3 priority areas of the upcoming S3 strategy to which their cluster organisation can contribute. The results show that the priority areas "Green Economy" and "Emerging Industries" are the two priority areas of the upcoming S3 strategy of Silesia to which most cluster organisations can contribute followed by the priority area "Health & Medical sectors".

Figure 14: Results of voting – Top 3 priority areas of the upcoming S3 strategy to which Silesian cluster can contribute



Source: ECCP (2022), based on an online voting conducted during the Clusters meet Regions' event in Silesia between 7th and 8th November 2022. n=25

Annex

Regional Innovation Scoreboard 2021

Table 1: Regional Innovation Scoreboard Silesia (PL22)

	Data	Normalised score	Relative to	
			PL	EU
Tertiary education	42.4	0.645	96	112
Lifelong learning	5.0	0.186	104	46
International scientific co-publications	379	0.316	86	56
Most-cited scientific publications	4.1	0.181	82	33
Above average digital skills	21.0	0.300	100	57
R&D expenditures public sector	0.20	0.124	47	26
R&D expenditures business sector	0.50	0.179	63	34
Non-R&D innovation expenditures	±	0.280	±	±
Innovation expenditures per person employed	±	0.297	±	±
Employed ICT specialists	2.7	0.327	85	65
Product innovators	±	0.250	±	±
Business process innovators	±	0.130	±	±
Innovative SMEs collaborating	±	0.181	±	±
Public-private co-publications	73.1	0.304	105	61
PCT patent applications	0.39	0.209	92	34
Trademark applications	2.93	0.214	68	47
Design applications	4.24	0.592	95	103
Employment knowledge-intensive activities	15.6	0.600	125	101
Employment innovative enterprises	±	0.117	±	±
Sales of innovative products	±	0.298	±	±
Air emissions by fine particulates	28.4	0.000	0	0
Average score	--	0.273	--	--
Country EIS-RIS correction factor	--	0.995	--	--
Regional Innovation Index 2021	--	0.272	--	--
RII 2021 (same year)	--	--	88.5	50.5
RII 2021 (cf. to EU 2014)	--	--	--	58.0
Regional Innovation Index 2014	--	0.215	--	--
RII 2014 (same year)	--	--	93.7	46.0
RII - change between 2014 and 2021	--	12.0	--	--

± Relative-to-EU scores are not shown as these would allow recalculating confidential regional CIS data.

Source: Regional Innovation Scoreboard

List of cluster organisations in the Silesia region

Table 2: Overview of cluster organisations in Silesia and their addressed EU industrial ecosystems

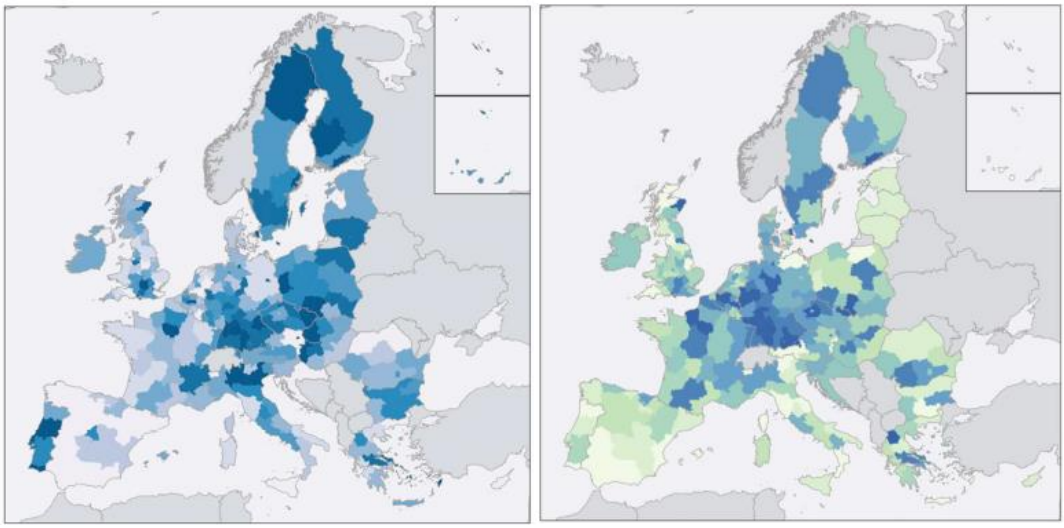
N°	Cluster organisation	Industrial Ecosystem
1	Cluster of Energy Efficient and Passive Building	Construction
2	Cluster of Mining Machines	Energy Intensive Industries
3	E-South Cluster	Digital
4	Euro-Centre Cluster of Energy Saving Technology	Construction
5	Human Cloud Cluster	Digital
6	Innovative Silesian cluster of clean coal technologies	Energy
7	MedSilesia - The Silesian Network of Medical Devices	Health
8	Polish Aluminium Cluster	Energy Intensive Industries
9	Polish Innovative Medical Cluster PIKMED	Health
10	Silesia Automotive & Advanced Manufacturing	Mobility, Transport & Automotive
11	Silesia ICT Cluster	Digital
12	Silesian Aviation Cluster	Aerospace & Defence
13	Silesian Cluster for Culture, Tourism, and Recreation	Tourism
14	Silesian Design Cluster	Creative and Cultural Industries
15	Silesian Ecological Cluster	Renewable Energies
16	Silesian ICT & Multimedia Cluster	Digital
17	Silesian Logistics Cluster	Mobility, Transport & Automotive
18	Silesian Nano Cluster	Health, Electronics
19	Silesian Urban Transport Cluster	Mobility, Transport & Automotive
20	Silesian Water Cluster	Renewable Energies

21	**SINOTAIC - Silesian IoT Cluster**	**Digital**
22	**Southern Railway Cluster**	**Mobility, Transport & Automotive**

Source: ECCP (2022) and own adaptations from the Polish Cluster Benchmarking Report 2020. PARP (2021): Benchmarking klastrów w Polsce – edycja 2020. Raport ogólny. Available under: https://www.parp.gov.pl/component/publications/publication/benchmarking-klastrow-w-polsce-edycja-2020 (last accessed 10.10.2022) as well as the Regional Innovation Strategy of the Silesian Voivodeship 2030. Available under: https://ris.slaskie.pl/dokument/regionalna_strategia_innowacji_wojewodztwa_slaskiego_2030 (last accessed 13.10.2022) and the Technology Development Program of the Silesian Voivodeship for the years 2019 – 2030. Available under: https://ris.slaskie.pl/dokument/program_rozwoju_technologii_wojewodztwa_slaskiego_na_lata_2019__2030 (last accessed 13.10.2022)..

Indicators of cluster strength

Figure 15: 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.

S3 Strategy 2014-2020 of the Silesian region

Table 3: Overview of priority and sub-priority areas in the Silesian S3 Strategy 2014-2020

Priority	Sub-priorities
Emerging Industries	Eco industries; Creative industries; Maritime industries; Mobility industries; Mobile services industries; Personalised Medicine industries.
Energy	no sub-priorities
Green Economy	Renewable energy; Clean technologies; Energy-efficient construction (energy saving); Public transportation; Waste management and recycling; Sustainable use of land, water, and forests; Ecotourism
ICT	no sub-priorities
Medicine	no sub-priorities

Source: ECCP (2022).

Overview of industrial ecosystems

Figure 16: 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

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