EUROPEAN CLUSTER COLLABORATION PLATFORM

# Clusters meet Regions event in Milan

# “Twin Transition: Italian ecosystems and the European agenda for sustainability”

**Input paper**

An initiative of the European Union

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# Executive Summary

The following paper presents observations on the cluster landscape in Lombardy and outlines 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 meet Regions" event. The following key takeaways are summarised below:

## Context: Economic profile of Lombardy

- The region of Lombardy stands as the **largest regional economy** in Italy, accumulating a GDP of approximately €439.9 billion in 2022. Despite facing the economic challenges prompted by the Covid-19 pandemic, the region has displayed notable resilience. Due to its substantial contribution, it plays a pivotal role in the Italian economy, constituting approximately for a quarter of the nation's total exports.
- In terms of **employment**, the region is characterised by a large services sector, reflected by the Retail ecosystem, which is the largest ecosystem in the region. Furthermore, the region still has a relatively large industrial presence, with the Textile ecosystem exhibiting a specialisation agglomeration. Other ecosystems with a strong concentration in the region include Electronics, Aerospace & Defence, Cultural and Creative Industries, Digital, and Mobility - Transport – Automotive.
- The 2023 Regional Innovation Scoreboard classifies Lombardy as a "**Moderate Innovator +**". The region demonstrates strengths in indicators such as "International scientific co-publications", "Most-cited scientific co-publications", and "Public-private co-publications", alongside trademark and design applications, whereas R&D expenditures relative to its GDP are below its target.

## Clusters in Lombardy and their importance for regional economic development

- **15 cluster organisations** from Lombardy are registered on the ECCP website, the most out of all the Italian regions and cover 9 out of the 14 identified industrial ecosystems. The ECCP-registered cluster organisations in the region include all nine Lombardy Technology Clusters at the regional cluster, which are recognized and financially supported by the regional government. Furthermore, the ECCP cluster landscape encompasses 2 national clusters situated in Lombardy, alongside other entities registered as cluster organisations on the ECCP.
- 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 Lombardy.

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

- Seven Lombardy cluster organisations have participated in **10 ESCP** for Going International (ESCP-4i) projects while two cluster organisations took part in one ESCP-4x project. Additionally, one cluster is participating in the **Euroclusters** initiative PIMAP4Sustainability, aiming to enhance the innovation potential of European SMEs and companies in the field of photonics, advanced materials and advanced manufacturing.

- Moreover, a total of 27 beneficiaries from Lombardy have participated in 10 **I3 partnerships**, including Lombardy Technology Clusters such as the Lombardy Intelligent Factory Association, the Lombardy Energy Cleantech Cluster and the Cluster for Smart Cities and Communities.

## Smart Specialisation Strategy of Lombardy

- The Lombardy Technology Clusters have played a central role in the development of the Smart Specialisation Strategy, which identifies the following **8 innovation ecosystems**: Nutrition, Health & life science, Culture & knowledge, Connectivity & Information, Smart mobility & architecture, Sustainability, Social development and Advanced manufacturing.
- The Lombardy Technology Clusters generally contribute to all of these 8 innovation ecosystems. For the future, the Lombardy Technology Clusters expect a further increase in relevance, especially in the innovation ecosystems related to the **Twin Transition** (Sustainability & Connectivity & Information).

# 01

# Context: Economic profile of Lombardy

# 1. Context: Economic profile of Lombardy

The region of **Lombardy** (Italian: Lombardia), located in Northern Italy, holds a strategic position within the country's economic landscape. Bordered by Switzerland to the north and sharing boundaries with several Italian regions including Piedmont, Emilia-Romagna and Veneto, Lombardy serves as a crucial hub for commerce and industry in Italy. This geographic advantage contributes significantly to **Lombardy's economic interconnectedness within Europe**. Holding a population of 9.98 million as of 2023, the region accounts for 16.9 % of Italy's total population, positing it as the most populous region in the country, followed by the capital region of Lazio and Campania (See Table 1 in the Annex).[1] Spanning an area of 23.864 $\mathrm{km}^2$, making it the third largest in Italy, Lombardy is considered the most densely populated region in Italy, with a density of 432.3 (compared to the Italian average of 198.6 and the EU27 average of 108.9).[2] This section will provide a concise socio-economic overview of Lombardy, encompassing key aspects such as its macroeconomic profile and sectoral specialisation, as well as it's innovation and regional competitiveness performances.

## Macroeconomic profile of Lombardy

The region of Lombardy plays an important economic role in Italy. It serves as the **largest regional economy with a GDP in 2022 of approximately €439.9 billion**, constituting roughly 23 % of Italy's total GDP (€ 1.9 trillion).[3] As of 2022, Lombardy's per-capita GDP (PPS) stood at €46,000, above the Italian average of € 34,400 (EU27: €35,400), ranking second only to the autonomous province of Bolzano – South Tyrol (€56,900). The economy of Lombardy demonstrated steady growth in 2022, exceeding the 2019 GDP by 3.4 %, outpacing the national growth rate of 1 %.[4] This highlights the strength of the Lombardy region, with its growth performance being far above the country's average. It also underscores the **resilience of the region and capability to recover since the pandemic shock hit the region particularly hard**.[5] In terms of its gross value added (GVA), Lombardy generated approximately 23 % of the Italian economy's added value in 2022, with a significant share originating from the services sector (57 %) and industry (24 %) (See Table 1 in the Annex).[6] Over time, **Lombardy has developed into an important trade hub in Europe**. In 2022, the region exported goods amounting to €162.2 billion, with 53 % of these exports directed to EU countries, comprising approximately 26 % of Italy's total exports, and exhibiting a growth rate of 18.9 % compared to 2021.[7]

[1] Eurostat (2024): Population on 1 January by age, sex and NUTS 2 region. Available under: https://ec.europa.eu/eurostat/web/products-datasets/-/demo_r_d2jan (last access 21.02.2024).
[2] Eurostat (2024): Area by NUTS 3 region. Available under: https://ec.europa.eu/eurostat/web/products-datasets/-/reg_area3 (last access 21.02.2024).
[3] Eurostat (2024): Gross domestic product (GDP) at current market prices by NUTS 2 regions. Available under: https://ec.europa.eu/eurostat/databrowser/view/nama_10r_2gdp/default/table?lang=en&category=na10.nama10.nama_10reg.nama_10r_gdp (last access 06.03.2024).
[4] Banca d'Italia (2023).
[5] Rappelli & Zucchella (2023).
[6] Eurostat (2024): Gross value added at basic prices by NUTS 3 regions. Available under: https://ec.europa.eu/eurostat/web/products-datasets/-/nama_10r_3gva (last access 23.02.204).
[7] SACE (2024). Lombardy. Available under: https://www.sace.it/en/italy-map/detail/lombardy (last access 23.02.2024).

## Employment levels and specialisation in Lombardy

According to the most recent data from Eurostat, Lombardy's regional employment composition reflects a **notable focus on the service sector**, which constitutes approximately 43.0 % of the region's total employment, surpassing both the European and national levels. While the region makes up 22.1 % of total employment in wholesale and retail trade, transport, accommodation and food service activities, falling below both national and EU27 shares, the region exhibits comparatively high shares in Information and communication, financial and insurance activities as well as Professional, scientific and technical activities, along with administrative and support service activities, leading to this high share in services. Furthermore, Lombardy's **industrial reliance is reflected in the employment shares**, contributing around 26 %, exceeding national and EU27 levels.[8] In contrast, the agriculture sector is relatively small in terms of employment, contributing only 1.3 %, making it the Italian region with the lowest employment share and falling below both national (3.8 %) and EU27 (3.7 %) shares. For a more detailed examination of the employment structure, the analysis extends to the NACE 2-digit level. Among the **largest employment sectors in Lombardy**, those associated with services and public administration emerge prominently. Notably, retail trade commands the highest share of employment at 7.8 %, followed by education and wholesale trade. Other significant sectors encompass human health activities, food and beverage service activities, and public administration & defence. Within the manufacturing sector, the manufacture of fabricated metal products makes up the largest sector in Lombardy, followed by the manufacture of machinery and equipment and manufacture of food products. Overall, the economical structure of Lombardy can be regarded as highly diversified and is at the same time the top Italian manufacturing region[9]. This further underlines the relevance of the Twin Transition for the region since especially the manufacturing sectors are facing a number of transformational challenges.

As part of its Industrial Strategy (March 2020), the European Commission has identified **14 industrial ecosystems** that are particularly relevant in Europe and encompass all players operating in a value chain.[10] The classification of the 14 industrial ecosystems has been calculated by aggregating NACE 2-digit activities, following the methodology established by the European Commission.[11] In Lombardy, the **Retail ecosystem emerges as the largest employment ecosystem with 16.3 %**, slightly higher than the EU27 level (16.2 %), but lower than the national level (16.6 %), as shown in Figure 1Figure 1. This is followed by Construction, at 15.2 % being higher than the EU27 and national shares. The importance of the manufacturing sector is reflected in the ecosystem Energy Intensive Industries, which constitutes 4.7 % across all ecosystems, higher than the Italian (4.0 %) and the EU27 (4.5 %) levels. Furthermore, **Textile makes an important ecosystem**, contributing 2.7 % of employment across the ecosystems while EU27 is 1.1 % and Italy 2.2 %. Other ecosystems that demonstrate a higher concentration of employment compared to the Italian and EU27 levels include **Electronics, Aerospace & Defence, Cultural and Creative Industries, Digital, and Mobility - Transport - Automotive**. In contrast, ecosystems such as Agri-Food and Health show a lower employment strength than other regions and thus can be found below the Italian and EU27 benchmarks.

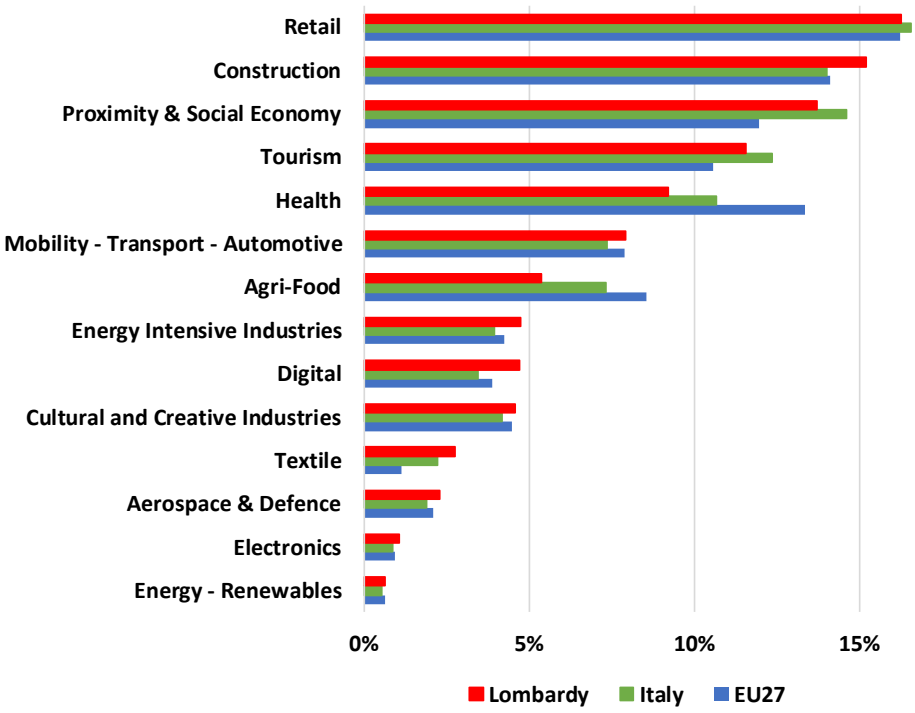
[8] Only the regions Marche, Veneto and Emilia-Romagna exhibit larger shares.

[9] see https://www.assolombarda.it/centro-studi/booklet-italy-lombardy-and-milan-ndeg-12-july-2023 (last access 27.02.2024).

[10] See here for more information https://clustercollaboration.eu/in-focus/industrial-ecosystems (last access 24.07.2023).

[11] See European Commission (2022): Annual Single Market Report, SWD (2022), available online https://ec.europa.eu/docsroom/documents/48877 (last access 24.07.2023).

*Figure 1: Employment across the industrial ecosystems for Lombardy, Italy and the EU27 (in 2020)*




Source: ECCP (2024), own elaboration based on Eurostat.

To analyse employment specialisation in Lombardy, this paper examines the region's regionally relevant sectoral and ecosystem agglomerations.[12] For Lombardy, a total of **7 regionally relevant sectoral agglomerations** can be detected. The sector Activities of households as employers of domestic personnel exhibits the agglomeration with the highest sector concentration. Similarly, the sector "Other personal service activities" exhibits an agglomeration. Both of these sectors are reflected in the ecosystem Proximity & Social Economy. Moreover, three out of the seven regionally relevant agglomerations are found in manufacturing sectors, highlighting the continually important role of this industry in the regional economic structures of Lombardy. These encompass the two largest manufacturing sectors by employment, namely manufacture of fabricated metal products and the manufacture of machinery and equipment. Both sectors are covered by the ecosystem Energy Intensive Industries. Furthermore, the sector manufacture of wearing apparel also demonstrates an agglomeration, being the second largest in terms of sector concentration. This sector is featured in the Textile ecosystem, which exhibits the **only regionally relevant ecosystem agglomeration observed** in the region.[13] This agglomeration results mainly from its high employment share across the ecosystems in the region compared to the EU27 share. In this ecosystem, there are also other sectors featured that show a high employment concentration in comparison to the EU27 but are not large enough in employment in order to be considered as a regionally

[12] 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 agglomeration and if the activity accounts for at least 1 % of total employment in the region, it is considered regionally relevant.

[13] An overview of the regionally relevant sectoral and ecosystem agglomerations of Lombardy can be found in the Annex, presented in Table 2 and Table 3, respectively.

relevant agglomeration. These sectors include the manufacture of leather and related products as well as the manufacture of textiles.

The above analysis indicated that the regional economy of Lombardy encompasses a **wide range of industrial ecosystems**, each offering diverse opportunities for regional growth. To unlock the region's growth potential, leveraging economic and cluster structures is instrumental. **Cross-border collaboration and the development of strategic clusters** are paramount in this endeavour. The Lombardy Smart Specialisation Strategy, which includes the fields Health & life science, Connectivity & Information, Smart mobility & architecture, Sustainability and Advanced manufacturing, offers promising avenues for future growth and innovation. Aligning regional initiatives with these strategic priorities can pave the way for sustained economic progress and prosperity. These areas of Smart Specialisation will be further explored in Chapter 4.

## Regional innovation performance of Lombardy

Reports suggest that the region's strong economic performance is also accompanied, at least in part, by a **robust innovation performance**. Despite making up only 17 % of the Italian population in this region, Lombardy accounts for 20 % of the R&D expenditure, produces 23 % of highly cited scientific publications, fosters 27 % of innovative start-ups, holds 31 % of patents and employs 33 % of the country's workers in high-tech manufacturing in 2022.[14] Lombardy's ratio of companies per 1,000 inhabitants surpasses the national average, with 81.3 compared to 74.2, further establishing itself as an appealing region for business endeavours.[15]

The **2023 Regional Innovation Scoreboard (RIS)** provides another avenue for assessing its level of innovativeness. The RIS contains data on 21 innovation-related indicators across 10 dimensions for European regions at the NUTS-2 level. According to the RIS, the region of Lombardy stands out as a **"Moderate Innovator +"** with a RII score of 97.4 (EU27 = 100), exhibiting a slightly lower innovation performance than the EU27 average, but a higher score than the national average (90.3). Over time, its innovation performance has shown significant improvement, with a 17.6 % increase since 2016.

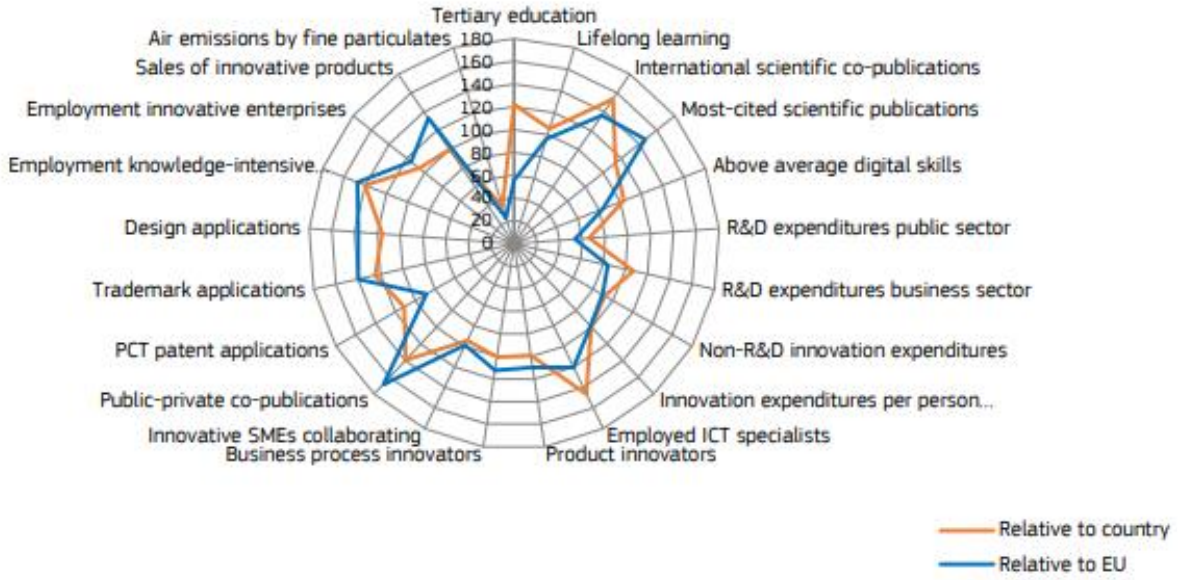
Lombardy's regional innovation ecosystem showcases considerable strengths across various dimensions, as shown in Figure 2. Particularly noteworthy are the indicators of "International scientific co-publications" and "Most-cited scientific co-publications", which fall within the dimension attractive research systems. Both indicators exhibit high performance scores surpassing both the Italian and the EU27 averages. This underscores Lombardy's **robust collaborative research environment and its ability to produce high-impact publications**, positioning the region favourably within the global research landscape. Building upon this, the Regional Innovation Score (RIS) also reflects high performance in "Public-private co-publications", indicating active collaboration between researchers in the business sector and those in the public sector, surpassing both the Italian and the EU27 averages. This underscores the region's **relatively strong research linkages between academia and industry**, fostering innovation and knowledge exchange.

Furthermore, the indicators of "Employment knowledge-intensive activities" and "Employment innovative enterprises" show high performance levels compared to Italy and the EU27. These indicators highlight the significant role of **innovation-driven enterprises in Lombardy's economy**, contributing to both employment stability and growth, particularly during economic downturns. Lombardy also exhibits a higher score on trademark and design applications compared to Italy and the EU27.

[14] Assolombarda (2022). Booklet Ricerca e Innovazione. Available under: https://media.assolombarda.it/centro-studi/booklet-ricerca-e-innovazione-ndeg5-2022 (last access 22.02.2024).

[15] Rappelli & Zucchella (2023).

*Figure 2: Innovation performance of Lombardy in the Regional Innovation Scoreboard (2023)*




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

Overall, the **knowledge and research ecosystem in Lombardy is well-established and highly oriented toward innovation**. The region is home to internationally renowned universities and research organisations. It also ranks among the top Italian regions in R&D investment.[16] However, in relation to its regional GDP**, Lombardy's total R&D expenditure remains lower than the Italian and European average**. In 2021, the total R&D share stood at 1.29 %, below both the Italian (1.43 %) and European (2.27 %) levels. Public R&D spending as a percentage of GDP has remained stagnant at 0.29 %, consistent with 2015 figures and notably below the Italian target value for 2023 (0.38 %). Although private sector R&D expenditure increased from 0.89 % in 2015 to 0.96 % in 2021, it has plateaued in recent years and falls short of the targeted value of 1.32 %. While private sector investment exceeds the national average (0.86 %), it lags behind the EU27 average and trails behind regions such as Piedmont and Emilia-Romagna.[17] This suggests there is room for improvement in Lombardy's R&D investment landscape.

## Regional competitiveness level of Lombardy

To conclude the chapter on the region's economic profile, the focus lies on the ranking of Lombardy 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 8 in the Annex. According to this, the region of Lombardy overall performs above the EU average, with a score of **103.2**, ranking 98th out of all 234 regions assessed in the Regional Competitiveness Index. Not only does it have the highest score across all Italian regions but it is also the only Italian region classified as a **more developed region**.

[16] Eurostat (2023): GERD by sector of performance and NUTS 2 regions. Available under https://ec.europa.eu/eurostat/en/web/products-datasets/-/RD_E_GERDREG (last access 23.02.2024).
[17] ibid.

In these three dimensions, the region particularly exhibits a commendable performance in the Efficiency Sub-Index exceeding both the EU27 and Italian average. This above average score is likely driven by their **substantial market size**. In the Innovation Sub-Index, the region of Lombardy exhibits a performance higher than the Italian average, while being at the same level as the EU27 average. Within this sub-index, the **innovation and business sophistication pillar stands out**, surpassing both the national and EU27 averages.

The Regional Competitiveness Index also reveals areas for **potential improvement**. In terms of the Institutions pillar, Lombardy falls below both the Italian and EU27 averages, suggesting potential improvements in governance and regulatory frameworks. Similarly, within the Macroeconomic pillar, the region lags behind the EU27 average, indicating a need for strategies to bolster macroeconomic stability and resilience. Moreover, in the Higher education and LLL pillar, Lombardy trails below both the Italian and EU27 averages, **signalling opportunities for strengthening educational institutions and promoting lifelong learning initiatives**. Additionally, Lombardy's technological readiness, as indicated by its performance in the Innovation Sub-Index, is below both the Italian and EU27 averages, underscoring the **importance of investing in technological infrastructure and fostering innovation ecosystems** to enhance competitiveness and foster economic growth.

# 02

# Clusters in Lombardy & their importance for regional economic development

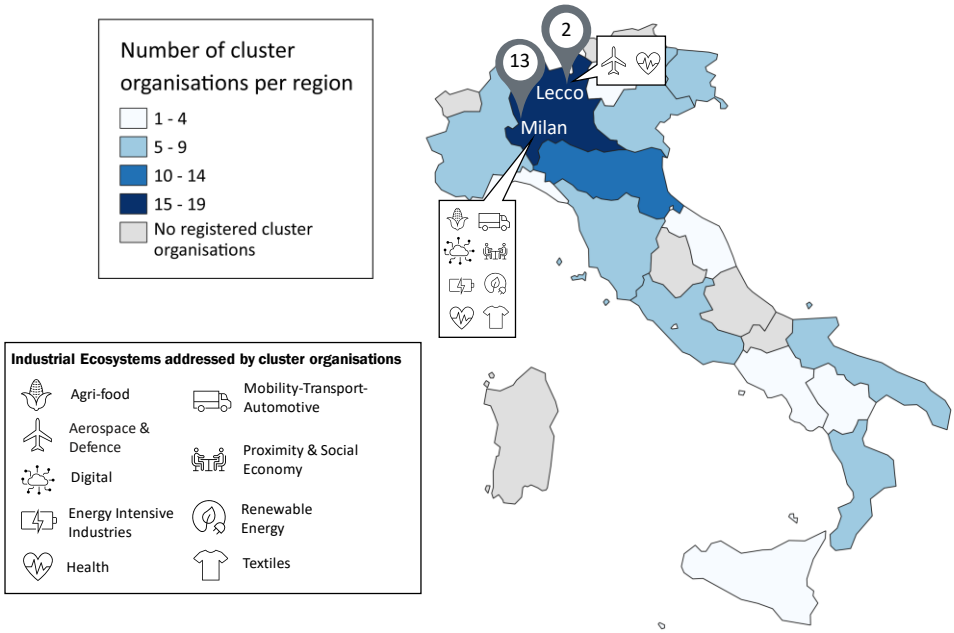
# 2. Clusters in Lombardy and their importance for regional economic development

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 ECCP cluster landscape in Lombardy and the policy framework under which the regional Lombardy Technology Clusters are operating in the region.

## Cluster organisations in Lombardy

The European Cluster Collaboration Platform (ECCP) 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 Lombardy on the ECCP gives the first impression of the intensity of organisation in regional industrial networks. Out of the total 1,156 registered EU-27 cluster organisations on the ECCP, **15 cluster organisations are located in Lombardy**. Hence, the region is home to most of the Italian cluster organisations registered on the ECCP (in total 96). Following closely behind is the region of Emilia-Romagna with 11 registered cluster organisations and Piedmont with 10. Figure 3 Figure 3 displays the geographical distribution of the cluster organisations in Lombardy. The region shows a highly centralised cluster landscape, with 13 out of 15 cluster organisations located in the province of Milan[18]. Other cities with one cluster organisation registered on the ECCP each are Lecco and Varese.

*Figure 3: Overview of ECCP-registered cluster organisations in Italy as well as regional and sectoral distribution of active cluster organisations in Lombardy*




Source: ECCP (2024). Own elaboration based on https://reporting.clustercollaboration.eu/all; last access 26.02.2024. A full overview of the 15 clusters is provided in Table 4 in the Annex.

[18] The location of each cluster organsiations is based on the information provided by each organisation on the ECCP.

The 15 cluster organisations registered on the ECCP, as depicted in Figure 3, encompass **all nine Lombardy Technology Clusters (LTC)**, which will be explained further below in the chapter. These cluster organisations are recognised by the regional government of Lombardy, hence classified as regional cluster organisations. Box 1 provides an overview of the LTCs. Aside from these regional cluster organisations, there are also two cluster organisations that despite their location in the region have a national relevance and thus are considered national cluster organisations. These include SPRING – Italian Circular Bioeconomy Cluster and the National Technological Cluster Made in Italy (MinIT). Moreover, other entities not recognised as regional clusters by the regional government yet operate similarly to cluster organizations are also profiled on the ECCP, including Consorzio Italbiotec and Sistema Cosmetico Lombardo. A list of all 15 ECCP-registered cluster organisations are depicted in Table 4 in the Annex.

***Box 1: Overview of the nine Lombardy Technology Clusters (LTC)***

**Overview of the nine Lombardy Technology Clusters (LTC)**

The regional government of Lombardy, Regione Lombardia, has recognised and financially supported the development of nine technology clusters at the regional level, for the start-up and consolidation level, with the aim of involving the entire innovation ecosystem and facilitating collaborations and synergies between the various players. Each regional technology cluster covers nine selected technology fields:

- **Lombardia Aerospace Cluster**, with 114 members,
- **High Technology Cluster Agrifood Lombardy (CAT.AL)**, which counts 14 members,
- **Lombardy Green Chemistry Association**, which counts 50 members,
- **Lombardy Energy Cleantech Cluster**, with 140 members,
- **Lombardy Intelligent Factory Association (AFIL)**, which counts 143 members
- **Lombardy Mobility Cluster**, which counts 100 members,
- **Lombardy Life Science Cluster**, with 114 members,
- **Cluster of Technologies for Smart Cities and Communities Lombardy (Cluster SCC)**, with 88 members,
- **Lombardy Cluster for Technologies for Living Environment Foundation**, with 31 members.

Source: ECCP (2024) based on Confindustria Lombardia (2024).

The ECCP-registered cluster organisations in Lombardy can be related to **9 out of 14 different EU industrial ecosystems**[19] (see also Table 4 in the Annex). The strongest industrial ecosystem is Health, with four cluster organisations involved. This is closely followed by the Digital and the Energy – Renewables ecosystems, which both account for 3 cluster organisations. This reflects the importance as well as the competencies of the region for the digital and green transformation. Furthermore, the Agri-Food ecosystem is represented by two cluster organisations, while the ecosystems Aerospace & Defence, Textile, Energy Intensive Industries, Mobility – Transport – Automotive and Proximity & Social Economy are covered by the ECCP cluster landscape with one cluster organisation each.

[19] https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en (last access 13.01.2024).

*Figure 4: Overview of organisation, structure, and thematic orientation of ECCP-registered cluster organisations in Lombardy*

## Organisation

- Majority of cluster organisations (11) rather small with 1-5 employees (73%; ØEU: 67%)
- 3 middle-sized cluster organisations with 6-10 employees (20%; ØEU: 20%)
- One cluster organisations with more than 20 employees (1%; ØEU: 4%)

## Member structure

- 3 cluster organisations rather small with up to 50 members (20%; ØEU: 34%)
- 7 cluster organisations with 51-100 members (47%; ØEU: 27%).
- Four larger cluster organisations with more than 100 members (33%; ØEU: 37%).

## Thematic orientation

- Cluster organisations in Lombardy can be related to 9 different EU industrial ecosystems
- Collaboration often sought in internationalisation, partnering for projects, digitalisation as well as resource efficiency and circular economy

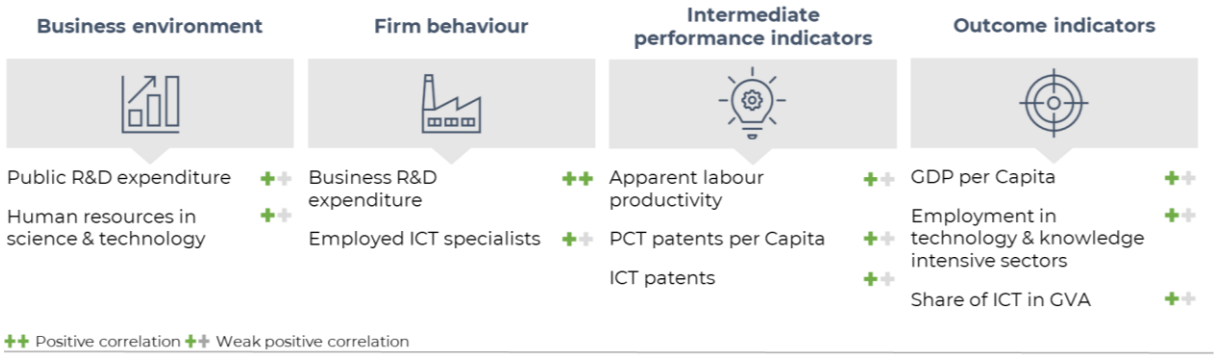
Source: ECCP (2024).

As shown in Figure 4 above, most of the cluster organisations registered on the ECCP in Lombardy are relatively small, with 11 out of 15 employing a staff of up to five individuals. Looking at their membership structure, these cluster organisations typically consist of around 51 to 100 members, while four larger organisations have memberships exceeding 100. Notably, collaboration interests primarily revolve around internationalisation, with a focus on project partnerships in digitalisation, efficiency, and the circular economy, highlighting the region's **active engagement in the twin transition processes**.

## The importance of clusters for regional economic competitiveness

The ECCP Summary report on cluster policies and programmes across Europe and priority third countries[20] also examines the relationship between clusters and regional competitiveness. The stand-out findings of this analysis are outlined in Figure 5 below and showcase how the presence of cluster organisations is positively correlated with different dimensions of regional economic competitiveness: Business environment, Firm behaviour, intermediate performance indicators and outcome indicators. This includes, for instance, the R&D expenditures of both the business and the public sector in the dimensions business environment and firm behaviour. Positive correlation is also found between clusters and more intermediate performance indicators such as labour productivity and patenting activities. On a more global scale, it is found that the presence of clusters is positively correlated with GDP per capita and employment in technology and knowledge-intensive sectors. Moreover, this examination also further reveals the relevance of cluster organisations for the Twin Transition as there is a positive correlation between clusters and employed ICT specialists, ICT patents and the share of ICT in gross value added. Nonetheless, it is also found that the presence of regional industrial agglomerations is also linked with higher air pollution.

***Figure 5: Relationship of clusters and regional competitiveness, correlation results***



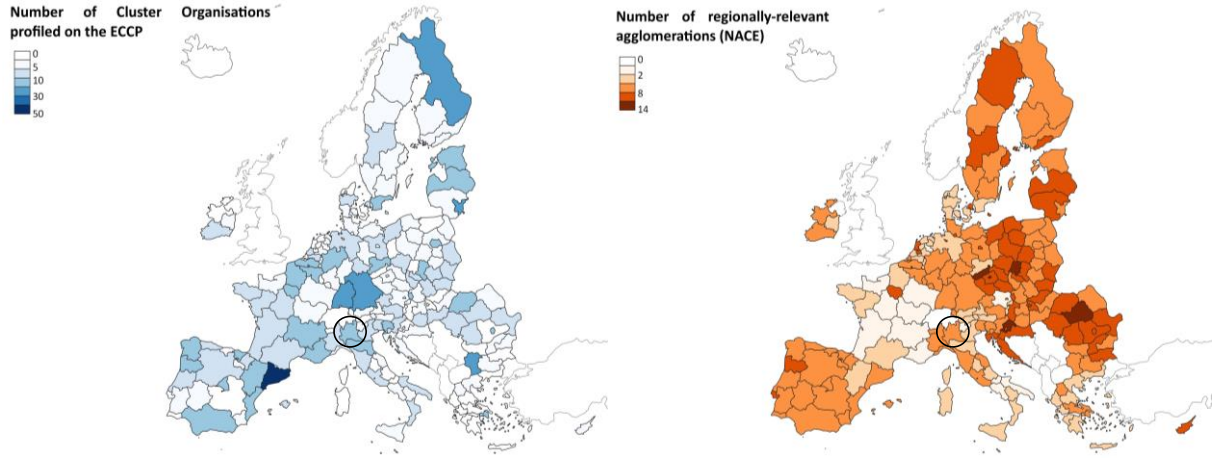

Source: ECCP (2024).

In addition to the previous examination of clusters and regional competitiveness, Figure 6 below shows that industries in Lombardy account for a medium-high number of region-relevant specialisation agglomerations[21] but a clearly above-average number of cluster organisations in comparison to other European regions.

[20] ECCP (2022): Summary report on cluster policies and programmes across Europe and priority third countries. Available online: https://clustercollaboration.eu/sites/default/files/sites/default/files/editor/ECCP_Summary%20report%20cluster%20policies_2022_finalv2.pdf (last access 27.02.2024).

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

*Figure 6: Distribution of regionally-relevant sector specialisation agglomerations and cluster organisations in the EU27*




Source: ECCP (2024), 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 further analysed their impact on regional economies. For example, Ketels and Protsiv (2021)[22] 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 and Protsiv show that "cluster strength" has a significant impact on "wages and prosperity".

A visualisation of this pattern can be found in Figure 14 in the Annex. In the context of the region of Lombardy, the statistical data and analysis of Ketels and Protsiv show a very high 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, strong clusters are very important for wages in Lombardy and they tend to be active in those economic sectors that account for particularly high wages when viewed across all European regions.

In conclusion, Lombardy's strength as one of the leading industrial regions of Europe is reflected in its agglomeration structure and relatively high concentration of cluster organisations. 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. The remainder of this chapter will look at the policy context for cluster development at the national and regional levels.

[22] Ketels, C. & Protsiv, S. (2021).

## Cluster policy in Lombardy

The origins[23] of Lombardy's cluster policy can be traced back to March 2001, when the region identified 16 "industrial districts of specialised production". These districts, which were intended as functional bodies for the promotion of innovative development programmes, were complemented in October of the same year by the establishment of *meta-districts*, namely "*production areas of excellence, with strong existing or potential links to the world of research and innovation production, capable of representing development poles with high technological potential*". At the onset of the 2007-2013 programming period, the meta-districts were renamed "Thematic Priority Areas" and their number significantly expanded through the experimental programme DRIADE (*Distretti Regionali per l'Innovazione, l'Attrattività e il Dinamismo dell'Economia locale* - Regional Districts for Innovation, Attractiveness and Local Economic Dynamism). In 2012, in parallel with the establishment of national and European policies, the existing "High Technology Districts" (which were established in 2011 to follow up on the DRIADE Programme) were then transformed into the aforementioned Regional Technology Clusters.

As mentioned, at the onset of the 2014-2020 programming period the regional government of Lombardy recognised a number of **regional technology clusters**, referred to as the Lombardy Technology Clusters, as key tenets of the regional innovation ecosystem. With time, the number has risen to nine selected technology fields, which closely align with the "national technology clusters" identified by the Italian state. The goal of each cluster is to offer opportunities for dialogue to define and implement research projects, as well as to favour the emergence of ambitious innovation initiatives through their expertise and in-depth knowledge of regional value chains. The 9 LTCs continuously map the competencies existing within them – and in the regional territory – in relation to the ecosystems of innovation identified by the Regional Innovation Strategy for Smart Specialisation, which they have contributed to define.[24]

Finally, the 2021-2027 regional programme[25] of the European Regional Development Fund (ERDF) for Lombardy indicates that the region will leverage the nine clusters for two specific objectives falling under priority axis one, namely "A more competitive and smarter Europe". The two specific objectives in question are the support to the implementation of complex R&D projects" and the "support to the internationalisation of SMEs".

[23] This paragraph relies on the communication by councillor Melazzini to the Regional Council at its meeting on 11 July 2014, available under https://gse.it/normativa_site/GSE%20Documenti%20normativa/LOMBARDIA_DGR_nX2146__11_07_2014.pdf (last access 26.02.2024).

[24] Confindustria Lombardia (2024): Lombardy Technology Clusters. Available under: https://confindustria.lombardia.it/cluster/Report9LombardyTechnologyClusters2024.pdf (last access 20.03.2024)

[25] The regional programme for Lombardy can be found here: https://fesr.regione.lombardia.it/attachments/file/view?hash=f3fc6e445f3d83164920356ef6b2dab82c1b1633a0bbafe4b9ea64ff85f05910&canCache=0 (last access 26.02.2024).

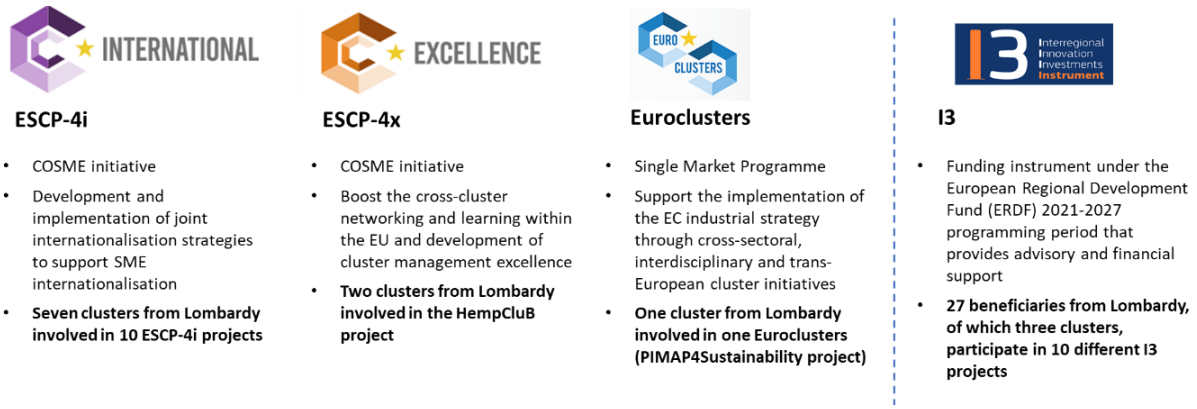
# 03

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

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

Findings from the Evaluation Study of and Potential Follow-Up to Cluster Initiatives under COSME, Horizon 2020 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.[26] To gain an overview of the existing cross-border cooperation of Lombardy clusters, a closer look will be taken in this chapter at their involvement in relevant European support initiatives (see Figure 7).

***Figure 7: Overview of selected EU support initiatives that involve clusters from Lombardy***




Source: ECCP (2024).

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

The European Strategic Cluster Partnership (ESCP) initiative funded under the EU Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) is a relevant EU support initiative to increase cross-border cooperation of EU cluster organisations and other intermediary organisations. The ESCP initiative established partnerships of European clusters and intermediary organisations from the different EU Member States or associated countries. Those partnerships 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) out of which the ESCP for Going International is still running throughout 2024[27] and the ESCP for Excellence[28] has just ended in December 2023.[29] Figure 7 provides an overview of the Lombardy clusters and projects in which they have participated or are participating. Seven clusters from Lombardy have participated

[26] 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 23.02.2024).

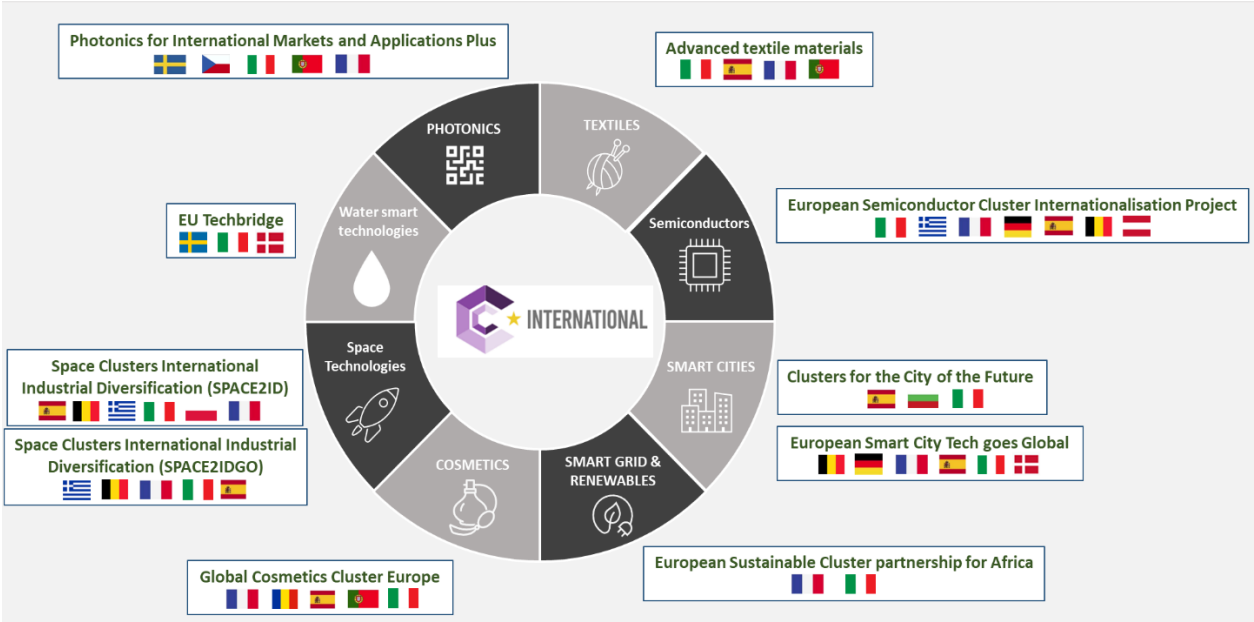
[27] https://clustercollaboration.eu/eu-cluster-partnerships/escp-4i/fourth-generation (last access 27.02.2024).

[28] https://clustercollaboration.eu/eu-cluster-partnerships/escp-4x (last access 27.02.2024).

[29] For more information on the European Cluster Partnerships see: https://clustercollaboration.eu/eu-cluster-partnerships (last access 13.01.2024).

or are participating in ten ESCPs for Going International (ESCP-4i) projects, while two are participating in the HempCluB ESCP-4x project. Overall, the projects requested grants for a combined value of € 828,600. Figure 8, below, visualises the 10 different ESCP-4i projects in which Lombardy clusters are involved. It shows that the projects involved cluster organisations from 12 different countries and pertained to diverse thematic areas, ranging from textiles to cosmetics, photonics and smart cities, amongst others. Moreover, the ESCP-4i projects in question looked towards diverse target markets in Africa (Algeria), Latin America (Ecuador, Chile, Brazil), Asia (China, India, Singapore, Japan) and Central and North America (USA, Canada, Mexico). The figure below recaps the participation of Lombardy clusters in ESCP-4i projects.

*Figure 8 - Overview of participation of Lombardy clusters in the ESCP-4i*




Source: ECCP (2024).

## Involvement of Lombardy clusters in the Eurocluster initiative

For the 2021-2027 funding period, the European Commission has launched the implementation of the EU Industrial Strategy. In this context, so-called Euroclusters[30] are funded under the Single Market Programme. The Euroclusters initiative aims at supporting cross-sectoral, cross-regional European industry clusters cooperating with other economic stakeholders such as companies or business organisations. One cluster organisation from Lombardy, AFIL – Lombardy Intelligent Factory Association, is part of a Eurocluster, namely **PIMAP4Sustainability**[31]. The initiative seeks to bring together six leading European clusters to leverage KETs technologies, photonics, advanced manufacturing and advanced materials to boost the innovation potential of European SMEs and companies in two key industrial European industries: metalworking and aerospace. Euroclusters offer a package of services and financial mechanisms dedicated to establishing European innovation projects, supporting the upskilling and reskilling of the workforce in critical innovative areas and maximising the international opportunities for SMEs.

[30] 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 10.01.2024).

[31] https://profile.clustercollaboration.eu/profile/cluster-partnership-initiative/9269ca3d-2a2b-4d1a-8fce-704a555fa42d (last access 27.02.2024).

## Involvement of Lombardy clusters in the Interregional Innovation Investments (I3) initiative

The Interregional Innovation Investments (I3 partnerships) is a funding instrument under the European Regional Development Fund (ERDF) 2021-2027 programming period that provides advisory and financial support through the European Innovation Council and SMEs Executive Agency (EISMEA).[32] Its goal is to assist interregional innovation projects during their mature phases in commercialisation and up-scaling by providing them with the tools to overcome regulatory and other barriers and bring their project to investment levels. For the 2021 programming period, there are €570 million available (up to €10 million per project) and EU contribution covers 70% for all beneficiaries and cost categories.

A total of 27 beneficiaries from Lombardy, both clusters and SMEs, take part in ten different I3 projects. At least three of the nine aforementioned Technology Clusters from Lombardy participate in I3 partnerships:

- The *Lombardy Energy Cleantech Cluster* is part of the **Resilient Innovation Ecosystems for European Value Chains** (RISE) project, whose objective is to accelerate the deployment of innovation capacity in the fields of Sustainable Manufacturing, bioeconomy, and Smart technologies amongst others. The projects counted eight partners from as many different European countries, and attracted a combined EU contribution of EUR 1,240,000.
- The *Lombardy Intelligent Factory Association* is part of 3 EU project funded under the I3 programme.
    - The **SMART-Growth** project seeks to apply Zero-Defect Manufacturing by means of Artificial Intelligence (AI) techniques to address the Detection, Prediction and Prevention of failures in a typical crystal growth process. If successful, the project will allow to enhance the yield of crystal production and improve the quality of the crystal. The projects counted nine partners from Germany, Italy and Romania, and attracted a combined EU contribution of EUR 2,996,000.
    - **BATMASS** project aims at implementing the first EU Circular Battery Valley and therefore providing a strategic response to the urgent need for sustainable battery production and recycling practices within the EU. In this sense, the project's objective is to establish a comprehensive interregional ecosystem for circular economy in the battery sector, focusing on the entire lifecycle of batteries (from production and usage to second life and recycling). The project counted 15 partners from Italy, Spain, France and Slovenia, and attracted a combined EU contribution of EUR 9,765,017.
    - **DeremCo** project aims to develop innovative systemic solutions for unlocking the great potential of End of Life composite materials as new manufacturing sources, with a set of actions inspired by two major general guidelines: Sustainable Manufacturing and Digitalization. The project counted 30 partners from seven European countries, and attracted a combined EU contribution of EUR 8,822,751.
- The *Cluster for Smart Cities and Communities* is involved in the **AMBITIOUS project**, which seeks to put in place the fundamental technological infrastructure that will provide advanced data aggregation and clean-up, analytics, AI-enabled forecasting and secure information exchange mechanisms to be integrated with existing, mature services (of at least TRL6) of the relevant stakeholders (SMEs), unleashing for them yet unforeseen functionalities and opening up new pathways of commercial exploitation. The project counted 18 partners from five different European countries, and attracted a combined EU contribution of EUR 4,383,000.

[32] For more information on I3 see: https://eismea.ec.europa.eu/programmes/interregional-innovation-investments-i3-instrument_en (last access 12.10.2023).

# 04

# Smart Specialisation Strategy of Lombardy

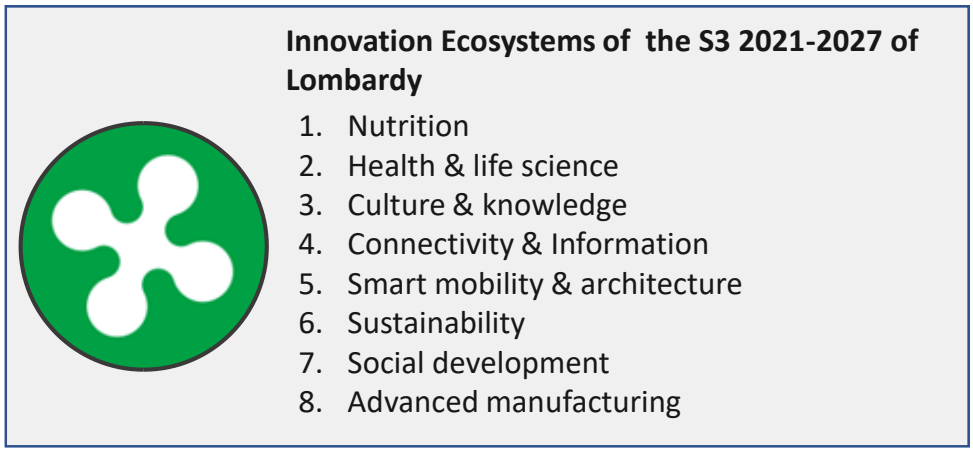
# 4. Smart Specialisation Strategy of Lombardy

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 2 at the end of this chapter provides some good practices of cluster involvement in S3 from other European regions and especially in the Entrepreneurial Discovery Process (EDP). Against this background, this chapter focuses on Smart Specialisation in Lombardy.

## The S3 of Lombardy

A key starting point for the analysis of the S3 2021-2027 in Lombardy is the updated regional Smart Specialisation Strategy for Research & Innovation 2021-2027. This strategy was developed by the Lombardy Region[33] and the updated version was published at the end of 2023. Cluster organisations (and especially the LTCs) play an important role in S3 2021-2027 of Lombardy. The S3 of Lombardy S3 approved by Regione Lombardia recognises clusters as as strategic players to address challenges and promote good practices in the industrial value chain. For instance, cluster organisations are involved in the coordination of regional policies of Lombardy and have been deeply involved in the development and update of Smart Specialisation in the region. In this regard, cluster organisations from Lombardy are central to the Entrepreneurial Discovery Process (EDP) as they support the bottom-up approach by connecting the economic and scientific sectors. Here, cluster organisations working groups were used to develop and update the S3 of Lombardy. In this regard, the Lombardy Roadmap for Research and Innovation on Circular Economy[34] can also be mentioned as cluster organisations from the region played a key role in the development of this strategy and since this roadmap also contributed to the S3 of Lombardy.

*Figure 9: Innovation Ecosystems identified in the S3 2021-2027 of Lombardy*




Source: ECCP (2024), own elaboration based on the Smart Specialisation Strategy for Research & Innovation 2021-2027 of Lombardy.

Hence, cluster organisations in Lombardy have been deeply involved in the S3 2021-2027 of Lombardy which identifies **eight Innovation Ecosystems** that are also illustrated in Figure 9. These Innovation

[33] https://www.regione.lombardia.it/wps/portal/istituzionale/ (last access 14.02.2024)

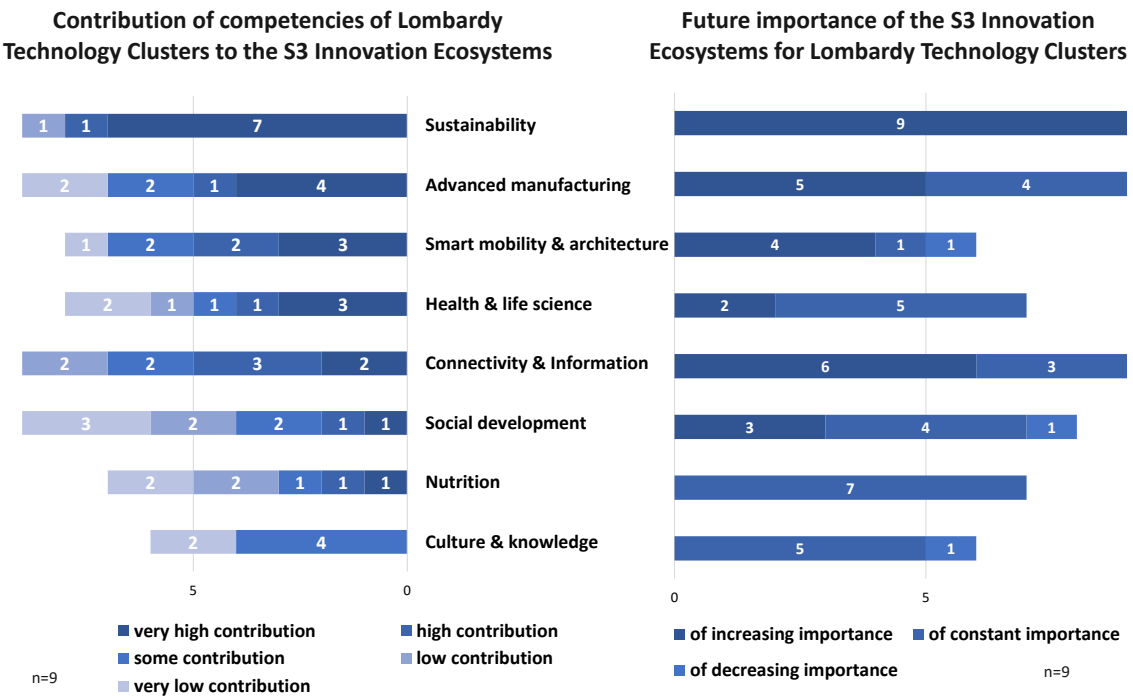
[34] More information on the Roadmap can be found here: https://openinnovation.regione.lombardia.it/en/lombardy-roadmap-for-research-and-innovation-on-circular-economy (last access 18.03.2024); The full version of the Roadmap can be downloaded here: https://mcusercontent.com/3d6635707000a80875042673b/files/9e94f39d-325a-4f9d-b938-b1eb434c9f85/DGR_XI_3098_2020_Roadmap_Economia_Circolare_RL.pdf (last access 18.03.2024).

Ecosystems range from “Nutrition” over “Connectivity & Information” to “Advanced manufacturing”. As a concluding remark, it can be highlighted that Lombardy is involved in more than 10 partnerships of the S3 thematic platform “Industrial Modernisation” and is the lead in the partnerships “GO4Cosmetics”, “Efficient and Sustainable Manufacturing”, “Chemicals”and “ADMAEnergy”.[35] Moreover, the region is among the leading regions in the partnership “Bioeconomy”. A strong connection and synergy exists between the S3 thematic platforms and the Vanguard Initiave.

## Outlook: Competencies and involvement of the Lombardy Technology Clusters in Smart Specialisation

Results of an online survey conducted with all of the Lombardy Technology Clusters show that they are generally contributing to all Innovation Ecosystems identified in the Smart Specialisation Strategy for Research & Innovation 2021-2027 of Lombardy (see Figure 10). This can be understood as an indicator for a functioning EDP as well as good priority setting in the region. Overall, the Innovation Ecosystem of “Sustainability” is the area where almost all Lombardy Technology Clusters are strongly contributing to. This is followed by the Innovation Ecosystems “Advanced manufacturing” and “Smart mobility & architecture”. Moreover, the Innovation Ecosystem “Connectivity & Information” is also an area where the majority of Lombardy Technology Clusters are highly or very highly contributing to. This underlines the relevance of the Twin Transition of the Lombardy Technology Clusters which is also reflected in their assessment of the future importance of Innovation Ecosystems. Here, all Lombardy Technology Clusters see an increasing importance of the Innovation Ecosystem “Sustainability”. Other Innovation Ecosystems where the majority of Lombardy Technology Clusters see an increase in importance are “Connectivity & Information” and “Advanced manufacturing”.

*Figure 10: Survey results - Innovation Ecosystem of the S3 2021-2027 of Lombardy*



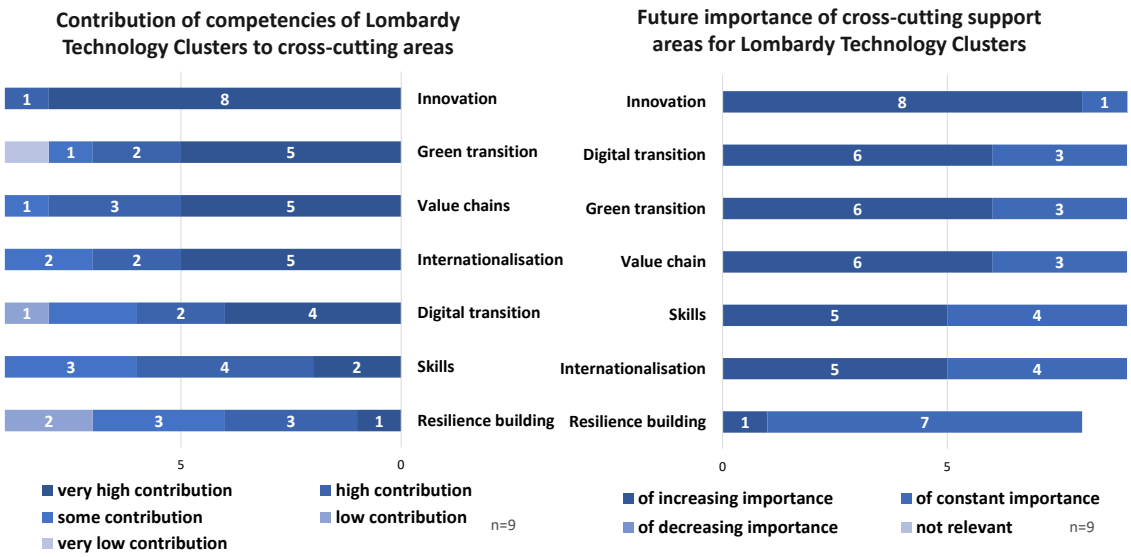

Source: ECCP (2024), results are based on the self-assessment of Lombardy Technology Clusters. Survey conducted in February - March 2024. Note: participants could select multiple items.

[35] https://ec.europa.eu/regional_policy/assets/s3-observatory/regions/itc4.html (last access 15.02.2024).

*Cross-cutting support areas and strategic challenges*

Figure 11 below shows the results of the survey concerning the cross-cutting support areas and strategic challenges of the Lombardy Technology Clusters. The areas where the majority of Lombardy Technology Clusters are highly or very highly contributing to are innovation, green transition, value chains and internationalisation. Concerning the assessment of the future importance of the cross-cutting support areas, innovation is also regarded as a key area by the Lombardy Technology Clusters. Other cross-cutting support areas where the majority of Lombardy Technology Clusters see increasing importance are related to the Twin Transition and value chains.

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

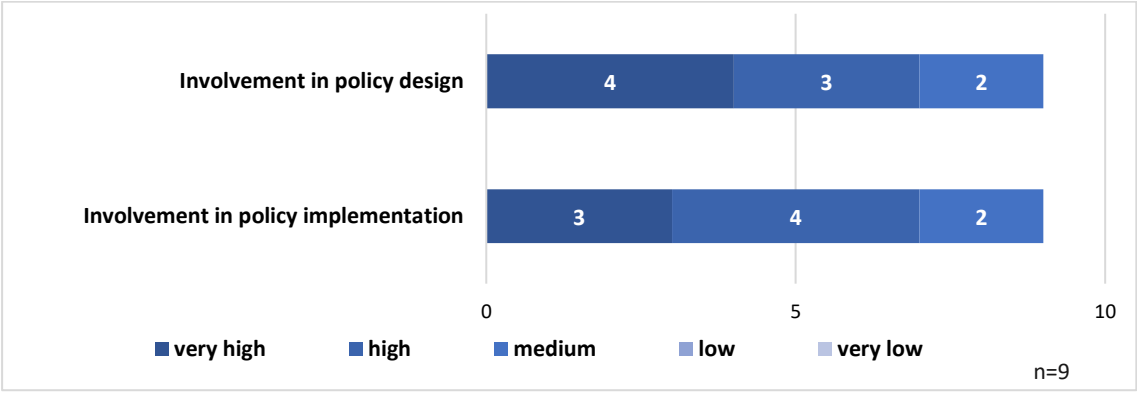



Source: ECCP (2024), results are based on the self-assessment of Lombardy Technology Clusters. Survey conducted in February - March 2024. Note: participants could select multiple items.

*Involvement of clusters in Lombardy in regional initiatives*

Cluster organisations can be involved in regional initiatives such as regional economic governance, policy design and implementation at the regional level. Lombardy Technology Clusters generally have been involved in both the policy design and policy implementation. Nonetheless, the survey results indicate a slightly higher involvement of Lombardy Technology Clusters in the policy design (see Figure 12).

***Figure 12: Survey results - Level of involvement in regional initiatives of Lombardy Technology Clusters in the 2021-2027 funding period***




Source: ECCP (2024), results are based on the self-assessment of Lombardy Technology Clusters. Survey conducted in February - March 2024. Note: participants could select multiple items.

Finally, the following Box 2 provides an overview of selected good practices from other European regions on the involvement of cluster organisations in S3 and in particular in the Entrepreneurial Discovery Process.

***Box 2: Good practices of cluster involvement in S3***

**Good practices of cluster involvement in S3**

**Basque Country, Spain – Cluster working groups**:
In the Basque Country, cluster organisations are actively involved in the identification of key sectors for the definition of the S3 priority areas to ensure an alignment with the strengths of the region. Moreover, cluster organisations are involved in the implementation of the S3 through working groups and special committees which develop project proposals that are submitted to various funding programmes (e.g., ERDF).

**Tuscany, Italy – Foresight & Roadmapping**:
In Tuscany, clusters were key actors involved in the EDP which built on a 5-step model for strategic planning based on foresight and roadmapping. In this process, the 13 regional Innovation Poles play a key role as they are tasked to organise open workshops in which scientific and technological roadmaps were developed based on foresight exercises on the regional strengths and weaknesses.

**Skåne, Sweden – Board of cluster organisations:**
In Skåne, the innovation strategy is part of Skåne's Regional Development Strategy (The Open Skåne 2030) and was developed by the Research and Innovation Council of Skåne. The Research and Innovation Council of Skåne is a forum of collaboration composed of a variety of actors from the public, private and the academic sector. Cluster organisations are represented in this Research and Innovation Council through the board of cluster organisations.

Source: ECCP (2024).

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e55b74b5c92b/Rapporto_Lombardia_2023_Rubbettino.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-41505b6a-a0ec-4a13-b70f-e55b74b5c92b-oRFZtyL (last access 23.02.2024).

# Annex

**Key socio-economic and sectoral indicators**

*Table 1: Key socio-economic and sectoral indicators of Lombardy, Italy and the EU27*

| Indicator | Reference Year | Lombardy (ITC 4) | Italy | EU27 |
|---|---|---|---|---|
| Population size (in ths) | 2023 | 9,977 | 58,997 | 448,754 |
| Total Area | 2023 | 23,864 | 302,079 | 4,225,134 |
| Population density | 2023 | 432.3 | 198.6 | 108.9 |
| GDP per capita (PPS) | 2021 | 46,000 | 34,400 | 35,400 |
| GDP (in mill) | 2022 | 439,986 | 1,946,479 | 15,905,280 |
| Share of GVA in: | | | | |
| Agriculture, forestry and fishing (A) | 2021 | 1.0 | 2.1 | 1.8 |
| Industry (except Construction (B-E) | 2021 | 23.8 | 20.6 | 20.2 |
| Construction (F) | 2021 | 4.7 | 5.2 | 5.4 |
| Services (G-N) | 2021 | 56.9 | 51.9 | 50.5 |
| Public administration (O-U) | 2021 | 13.6 | 20.1 | 22.1 |
| Share of employment in: | | | | |
| Agriculture, forestry and fishing (A) | 2022 | 1.3 | 3.8 | 3.7 |
| Industry (except Construction (C) | 2022 | 25.9 | 20.2 | 17.7 |
| Construction (F) | 2022 | 6.5 | 6.7 | 6.7 |
| Services (G-N) | 2022 | 43.0 | 41.9 | 40.6 |
| Public administration (O-U) | 2022 | 23.3 | 27.4 | 30.8 |

Source: ECCP (2024), own elaboration based on data from Eurostat.

**Employment Composition and Specialisation in Lombardy**

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

| Region | # of agglo. | Agglo. 1 | Agglo. 2 | Agglo. 3 | Agglo. 4 | Agglo. 5 |
|---|---|---|---|---|---|---|
| **ITC4: Lombardy** | 7 | T97 - Households as employers act. | C14 - Manuf. of wearing apparel | M74 - Other prof., scientific, techn. act. | M69 - Legal & accounting | S96 - Other personal services |

Source: ECCP (2024), own calculation and elaboration based on Eurostat data.

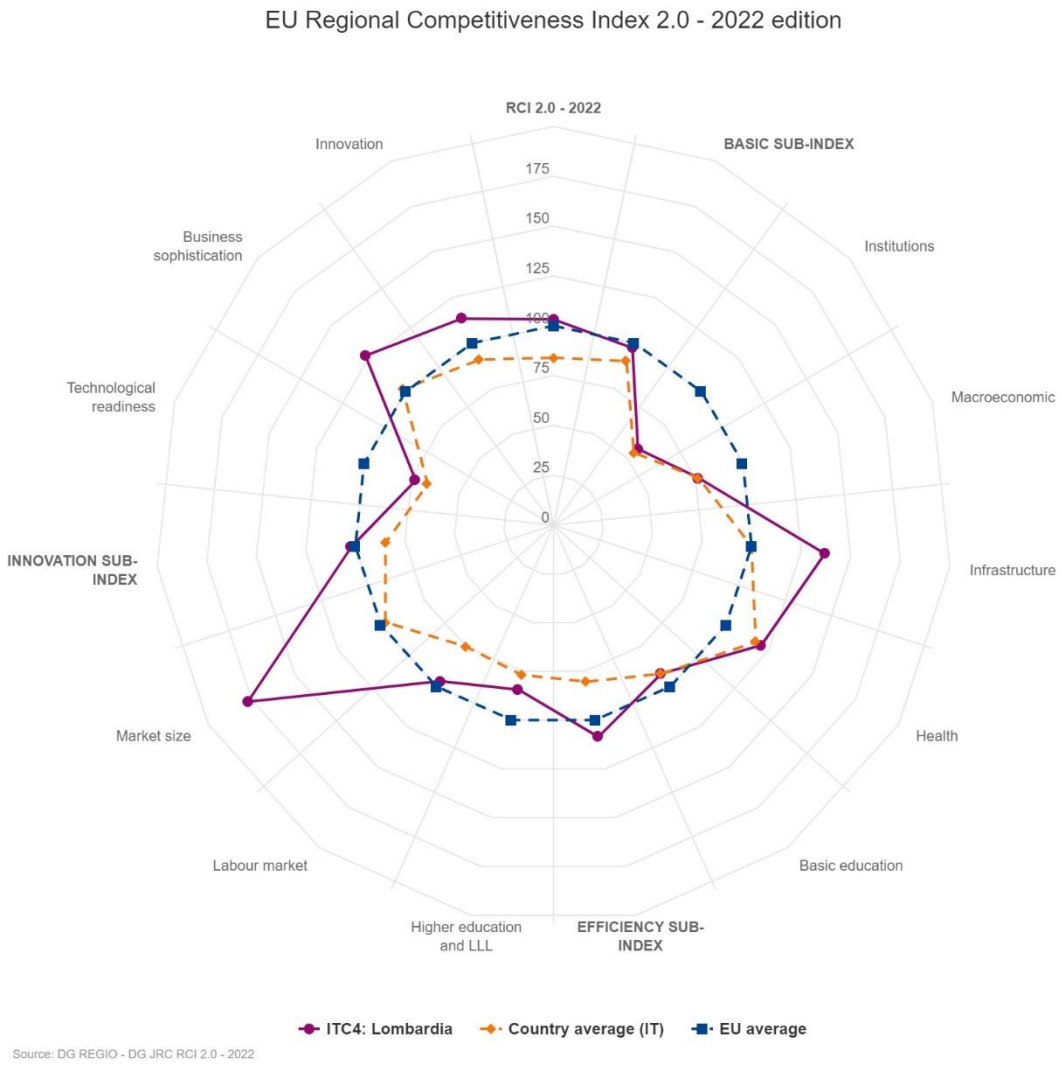
*Table 3: Number of regionally relevant ecosystem agglomerations and Top 5 agglomerations by region*

| Region | # of ecosystem agglo. | Agglo. 1 | Agglo. 2 | Agglo. 3 | Agglo. 4 | Agglo. 5 |
|---|---|---|---|---|---|---|
| **ITC4: Lombardy** | 1 | Textile | - | - | - | - |

Source: ECCP (2024), own calculation and elaboration based on Eurostat data.

**Employment Composition and Specialisation in Lombardy**

*Figure 13: Performance of Lombardy in the Regional Competitiveness Index*




Source: European Commission (2023): EU Regional Competitiveness Index 2.0 - 2022 edition.

**List of cluster organisations in Lombardy**

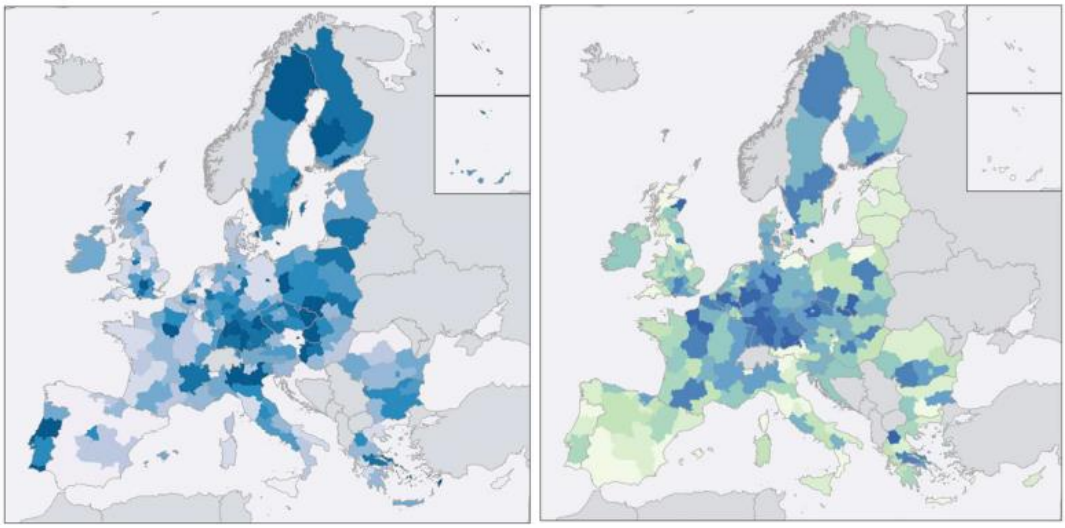
*Table 4: Overview of ECCP-registered cluster organisations in Lombardy and their addressed EU industrial ecosystems*

| No. | Cluster organisation | Industrial Ecosystem |
|---|---|---|
| **Lombardy Technology Clusters (LTC)** | | |
| 1 | **AFIL - Lombardy Intelligent Factory Association** | Digital |
| 2 | **CAT.AL, High Technology Agrifood Lombardy Cluster (Parco Tecnologico Padano)** | Agri-Food |
| 4 | **Fondazione Cluster Smart Cities & Communities (Cluster SCC) - Lombardia** | Digital |
| 6 | **Lombardia Aerospace Cluster** | Aerospace & Defence |
| 5 | **Lombardy Cluster Technologies for Living Environments** | Health |
| 6 | **Lombardy Energy Cleantech Cluster** | Energy - Renewables |
| 7 | **Lombardy Green Chemistry Cluster** | Energy-Intensive Industries |
| 8 | **Lombardy Life Sciences Cluster** | Health |
| 9 | **Lombardy Mobility Cluster** | Mobility-Transport-Automotive |
| **National Clusters located in Lombardy** | | |
| 10 | **National Technological Cluster Made in Italy (MinIT)** | Textile |
| 11 | **SPRING - Italian Circular Bioeconomy Cluster** | Energy - Renewable |
| **Other ECCP-registered cluster organisations located in Lombardy** | | |
| 12 | **Consorzio Italbiotec** | Agri-Food, Energy – Renewables, Health |
| 13 | **Fondazione Distretto Green & High Tech Monza Brianza** | Digital |
| 14 | **Sistema Cosmetico Lombardo** | Health |
| 15 | **TRIULZA** | Proximity & Social Economy |

Source: ECCP (2024) and own adaptations.

## Indicators of cluster strength

*Figure 14: 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.