EUROPEAN CLUSTER COLLABORATION PLATFORM

Clusters meet Regions' event "Enhancing cross-sectorial and trans-regional cooperation" – the case of Bulgaria

Input paper

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Executive Summary

The following paper presents observations on the cluster landscape in Bulgaria 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 Bulgaria

- The **Agri-Food and Textile ecosystems** play a significant role in Bulgaria's economy, showing specialisation in various regions across the country. Additionally, the capital region of South-West further specialises in the **Digital and Aerospace & Defense ecosystems**. Given its diverse sectoral composition and specialisation, Bulgaria's economy presents a diverse range of prospects in various sectors that can be leveraged to bolster regional growth through the support of economic and cluster structures.
- The **2023 European Innovation Scoreboard** classifies Bulgaria as an "Emerging Innovator". The country has shown noticeable improvements in product and business process indicators, as well as in the collaboration between innovative SMEs and public-private co-publications, albeit showing room for improvement. In the **2022 Regional Competitiveness Index**, Bulgaria's overall average score falls below the EU average, with significant variations in performance among Bulgarian regions. Notably, the South-West region stands out for its relatively high performance, particularly for the Higher education & lifelong learning, Labour market and Innovation pillars.

Clusters in Bulgaria and their importance for regional economic development

- **31 ECCP-registered clusters** are located in Bulgaria, covering 10 out of 14 EU Industrial Ecosystems. The Digital Ecosystem is particularly strong with 12 cluster organisations, followed by Renewable Energy and Mobility-Transport-Automotive with five each.
- 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 Bulgaria.

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

- In the **2014-2020 funding period**, nine Bulgarian cluster organisations participated in 15 projects under the banner of the European Strategic Cluster Partnership. The bulk of the projects concerned the ESCP for Going International (ESCP-4i), which accounted for nine of the aforementioned sixteen projects. In addition, three cluster organisations participated in the **Innosup-1** "Cluster facilitated projects for new value chains" initiative. The sectoral focuses of the three cluster organisations were digital technologies, mining and aeronautical engineering.
- In the **2021-2027 period**, three Bulgarian cluster organisations are involved in 4 Euroclusters which include 22 cluster partners from 11 different Member States.

Smart Specialisation in Bulgaria

- Cluster organisations (can) play an important role in the design and implementation of Smart Specialisation Strategies (S3). In Bulgaria, cluster organisations were involved in the **development of the S3** and the priority areas.
- The Bulgarian Smart Specialisation Innovation Strategy 2021-2027 identifies **five priority areas**. These priority areas are "Informatics and ICT", "Mechatronics & microelectronics", "Industry for healthy living, bioeconomy & biotechnology", "New technologies in the creative & creative industries" and "Clean technology, circular & low carbon economy".

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Context: Economic profile of Bulgaria

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1. Context: Economic profile of Bulgaria

This section will provide a concise socio-economic overview of Bulgaria, encompassing key aspects such as the macroeconomic profile, employment and regional specialisation, as well as its innovation and regional competitiveness performances. Thus, it aims to furnish the necessary context and insights pertaining to Bulgaria's cluster landscape.

Macroeconomic profile of Bulgaria

Bulgaria, situated in Southeast Europe, boasts a strategic geographic location at the crossroads of Europe and Asia. It shares borders with five other European states: Romania to the north, Serbia and North Macedonia to the west, and Greece and Turkey to the south. It is further connected to the Black Sea to the east. Additionally, its strategic position at the crossroads of major trade routes between Central and Eastern Europe provides Bulgaria with significant trade advantages and access to vital transport routes. The country is divided into six planning regions (NUTS2): North-West (BG31), North-Central (BG32), North-East (BG33), South-East (BG34), South-West (BG41), and South Central (BG42). As of the latest data available in 2022, **Bulgaria's population stands at approximately 6.84 million**.[1] The largest region by population is South-West, which includes the capital city Sofia, boasting a population of 2,070,000. Following closely are the regions of South Central with a population of 1,390,000 and South-East, with its capital Burgas, with a population of 1,010,000.[2]

Before the Covid-19 pandemic and the energy crisis triggered by the war in Ukraine, Bulgaria´s economy had been growing steadily, with **per-capita real GDP growing** by at least 3% every year since 2015 on the back of robust domestic demand. According to 2020 data published by the National Statistical Institute of Bulgaria, the two largest economic sectors in terms of contribution to GDP were *mining, quarrying and manufacturing* and *wholesale and retail trade*, which, combined, accounted for 39% to 41% of yearly GDP from 2015 onwards[3]. GDP per persons employed had also grown steadily over the same time period, owing mostly to an increase in Gross Value Added that can be attributed to the agricultural and manufacturing sectors. Within this context, the service nonetheless accounted for 69% of Gross Value Added in 2021, while industry and agriculture commanded 26.5% and 4.3% respectively4.

The **Covid-19 pandemic and the energy crisis had a significant, but comparatively rather contained, impact on Bulgaria's economy**. As regards the pandemic, the initial weakening of external demand, coupled with the decline in internal demand that ensued from the introduction of nationwide confinement measures, led to a strong economic contraction in the second quarter of 2020 (-10%). Overall, Bulgaria's real GDP contracted by roughly 4.0% in 2020, but the economy quickly made up for lost ground in 2021 (+7.6%) and, notably, has reset itself on the positive pre-pandemic trajectory, with GDP growth exceeding 3.4% in 2022. European Commission

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[1] Eurostat (2023): Population on 1 January. Available under:
https://ec.europa.eu/eurostat/databrowser/view/TPS00001__custom_6943937/default/table?lang=en (last accessed 24.07.2023).

[2] Eurostat (2023): Population on 1 January by age group, sex and NUTS 3 region. Available under:
https://ec.europa.eu/eurostat/databrowser/view/TGS00096__custom_6943885/default/table?lang=en (last accessed 24.07.2023).

[3] National Statistical Institute of Bulgaria (2022). "Bulgaria in figures", 2020 and 2021 editions. Available under https://www.bcci.bg/resources/files/BCCI_Bulgaria%20in%20figures_2022.pdf.

[4] Ibid.

estimates for 2023 suggest that GDP growth, while constrained by the energy crunch, will nonetheless be positive (+1.5%) and will pick up again by 2024 (+2.4%).[5]

Figure 1: Bulgaria Real GDP growth rate 2000-2021 (in %)
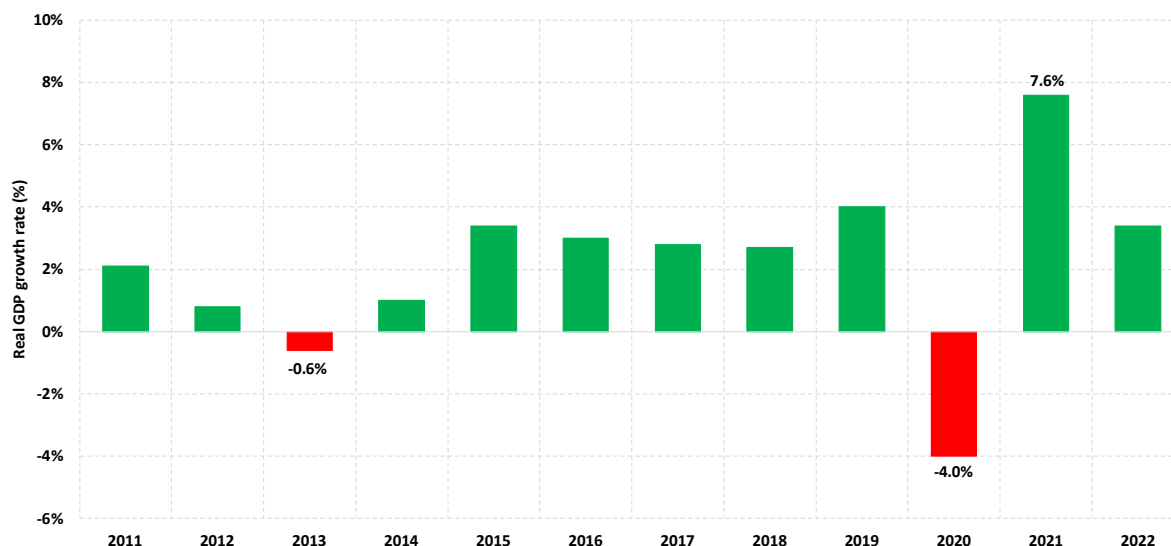
Source: ECCP (2023), own elaboration based on Eurostat.

At the national level, the economic output measured by **GDP per capita in 2022 amounted to €18,600**, lower than the EU average of €32,400 (See Table 1 in the Annex). However, in this regard, it is important to acknowledge significant regional disparities across the six planning regions of Bulgaria. The GDP per capita differs between the capital region South-West, and the other regions. The capital region of South-West stands out with a comparatively higher GDP per capita of €31,100, surpassing the national average and slightly below the European average. This distinction can be attributed to the region's robust services sector, particularly in the digital services industry. In contrast, the other planning regions exhibit a wider range of GDP per capita, spanning from €12,300 to €14,600.[6] These disparities are partially influenced by the predominant economic activities of those regions, with a prominent focus on agriculture and manufacturing. The differences in the sectoral composition are highlighted in the next subchapter.

Moreover, Bulgaria's strategic geographic location in Southeast Europe, particularly its access to the Black Sea and its connectivity with neighbouring European countries, plays a pivotal role in shaping its trade capacity. The nation's advantageous position facilitates both imports and exports, thereby influencing its trade balance. As of the latest available data in 2022, Bulgaria reported imports of goods and services amounting to €55.264 billion, and exports of goods and services reaching €47.805 billion, reflecting a relatively balanced trade balance of negative €7.459 billion.[7] Bulgaria's integration into the single market is evident, with 65.6% of its exports being intra-EU, demonstrating the significance of European Union member states as key trading partners. Similarly, 55.4% of Bulgaria's imports originate from other EU member states, indicating **strong economic ties within the**

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[5] For more details, see the European Commission Economic forecast for Bulgaria. Available under: https://economy-finance.ec.europa.eu/economic-surveillance-eu-economies/bulgaria/economic-forecast-bulgaria_en (last accessed 10.08.2023)

[6] Regional Innovation Scoreboard (2023): Bulgaria. Available under: https://ec.europa.eu/assets/rtd/ris/2023/ec_rtd_ris-regional-profiles-bulgaria.pdf (last accessed 24.07.2023).

[7] Eurostat (2023): Intra and Extra-EU trade by Member State and by product group. Available under: https://ec.europa.eu/eurostat/databrowser/view/EXT_LT_INTRATRD__custom_6994601/default/table?lang=en (last accessed 24.07.2023).

European Union. The openness of Bulgaria's trade is further evidenced by foreign trade's substantial share in the nation's GDP, constituting approximately 121.89 % of the total GDP.[8]

Employment and Regional Sector and Ecosystem Specialisation in Bulgaria

Based on the data pertaining to the distribution of employment across various industries in Bulgaria in 2023, the service sector accounts for 55.8% of overall employment in the region, below the EU27 average of 63.7%. Instead, **traditional industries, such as Agriculture & Mining (7.5%) as well as the Manufacturing sector (18.7%) hold a significant share of Bulgarian employment**, surpassing the EU average. Notably, these industries are more prominent in the less densely populated regions outside the capital region of South-West (BG41). In these regions, the share of agriculture & mining and manufacturing exceeds both the country and EU27 averages. In the region of South-East, traditional industries like agriculture & mining and manufacturing play an important role, with both exceeding the Bulgarian and EU27 average, whereas services only make up less than half (49.5%) of employment. On the other hand, the region of South-West is a more service-driven economy with services making up almost two-thirds of total employment, thus exceeding the Bulgarian and EU 27 average.

Figure 2: Top 10 sectors for employment in Bulgaria (in 2020)

Number of Persons Employed
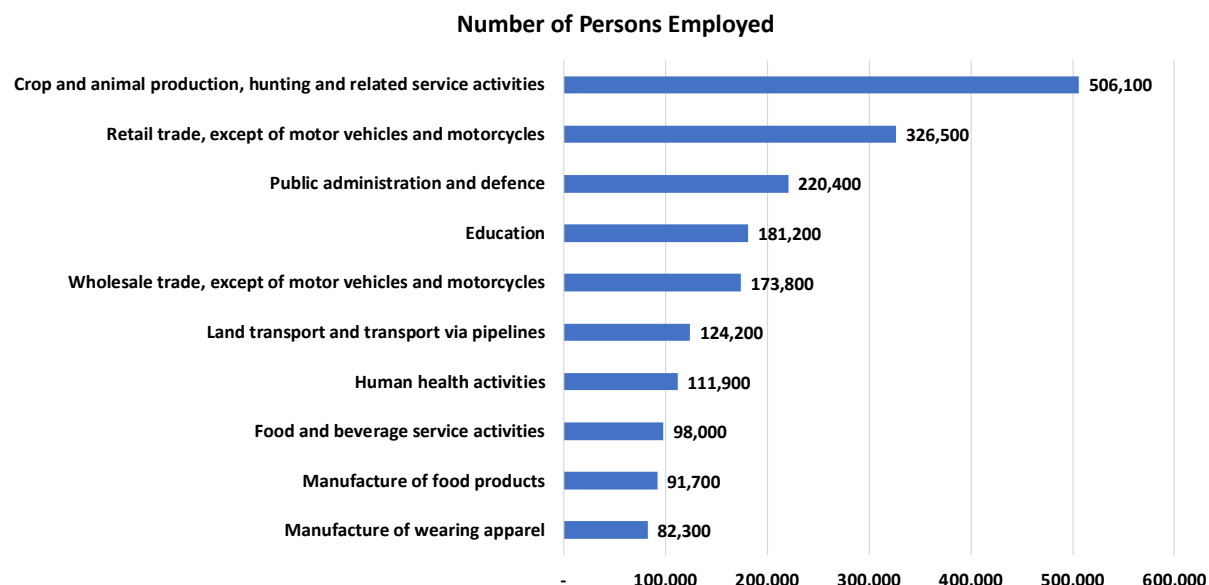
Source: ECCP (2023), own elaboration based on Eurostat.

Figure 2 presents a comprehensive breakdown of Bulgaria's key economic sectors concerning **employment**, shedding light on the relative significance of agriculture and manufacturing industries. Notably, the sector of "Crop and animal production, hunting, and related service activities" emerges as the largest employer in the country, employing approximately 506,000 individuals, accounting for 14% of total employment in the region. This substantial figure highlights its crucial role in the Bulgarian economy, especially when compared to the EU27 average of 4.18%. Public Administration Sectors also feature prominently, with "Public administration and defence" comprising 6.3% of employment, while "Education" accounts for 5.2% of total employment. Additionally, the importance of the services sector is underscored by the dominance of "Retail trade" and "Wholesale trade" as the leading sectors in terms of employment, representing 9.4% and 5.0% of Bulgaria's total

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[8] Own calculation based on Eurostat (2023): Eurostat (2023): Intra and Extra-EU trade by Member State and by product group. Available under:
https://ec.europa.eu/eurostat/databrowser/view/EXT_LT_INTRATRD/default/table?lang=en&category=ext_go.ext_go_agg.ext_go_lti.ext_go_lti_ext (last accessed 24.07.2023).

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employment, respectively. Manufacturing also holds a significant presence, with sectors like the "Manufacture of food products" and the "Manufacture of wearing apparel" employing 82,300 (2.6%) and 91,700 (2.4%) individuals, respectively, solidifying their role within the top 10 sectors by employment. These findings provide valuable insights into the sectoral composition of Bulgaria's employment, emphasizing the substantial contribution of key industries to the country's economic landscape.

As part of its Industrial Strategy (March 2020), the European Commission has selected **14 industrial ecosystems** that are particularly relevant in Europe and encompass all players operating in a value chain.[9] The classification of the 14 industrial ecosystems has been calculated by aggregating NACE 2-digit activities, following the methodology established by the European Commission.[10] In Bulgaria, the **Agri-Food Ecosystem** comprises the largest employment share across all ecosystems. The importance of this ecosystem is shown by its share compared to the EU27 average. This is particularly explained by the high number of persons employed in the sectors "Crop and animal production, hunting and related service activities", and the "Manufacture of food products", as shown in Figure 2. Other ecosystems that demonstrate a higher concentration of employment compared to the EU 27 average include **Energy Intensive Industries**, **Aerospace & Defence**, and **Energy – Renewables** and **Textile**. The latter has a significantly higher share of employment across the industrial ecosystems, due to its prominent manufacture of wearing apparel sector. Furthermore, the **Digital** as well as the **Cultural and Creative Industries** ecosystems are noteworthy to mention. Even though there at similar terms at the country level, the ecosystem is prominent in the South-West region, exceeding both the Bulgarian and EU27 region. A more detailed depiction of employment across the different ecosystems is provided in the Annex.

To analyse specialisation in Bulgaria, this paper examines the country's regionally relevant sectoral and ecosystem nodes.[11] Across all regions, there are a total of **47 regionally relevant sectoral nodes**, encompassing 21 sectors, while there is a total of **14 regionally relevant ecosystem nodes observed**, distributed across six industrial ecosystems.[12] Notably, the sector "Manufacture of wearing apparel" exhibits a node in every region, indicating its widespread presence and significance. The robust sector of "Manufacture of wearing apparel" (C14) and its widespread specialisation across all six Bulgarian regions can also be reflected in the **Textile ecosystem specialisation** node present in every Bulgarian region. Additionally, the **Agri-Food ecosystem** exhibits a specialisation node in four out of the five Bulgarian regions. In these regions, connections can be drawn to sectors such as "Crop and animal production" and "Forestry and logging", both of which display sectoral specialisation nodes. This specialisation is further evident in Bulgaria's overall strength in this particular industrial ecosystem, as depicted in Figure 13 (See Annex). Moreover, the **specialisation in the "Mining of coal & lignite" sector is exclusive to South-East Bulgaria**, highlighting its vital role in the regional economy. In the capital region of South-West, the identified nodes suggest **specialisation in the services sector**, specifically in areas such as telecommunications, computer programming, consultancy activities, and financial service activities. In addition to Textile and Agri-Food, two additional ecosystems can be identified, which are exclusive to the capital region of South-West Bulgaria, namely **Digital and Aerospace & Defence**. These ecosystems align with the region's sectoral specialisations, highlighting the distinct economic strengths and focus areas of this specific region.

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[9] See here for more information https://clustercollaboration.eu/in-focus/industrial-ecosystems (last accessed 24.07.2023).
[10] See European Commission (2021): Annual Single Market Report, SWD (2021), available online https://commission.europa.eu/system/files/2021-05/swd-annual-single-market-report-2021_en.pdf (last accessed 24.07.2023).

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

[12] An overview of the regionally relevant sectoral and ecosystem nodes of Bulgaria's regions can be found in the Annex, presented in Table 2 and Table 3, respectively.

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Drawing on the European Cluster Panorama 2021, visual representations of **industrial ecosystem specialisations** in various regions are provided.[13] This can enhance one's understanding of cluster organisation concentration on the basis of specific typologies as well as gain an outlook of how these vary across regions and countries. As depicted in Figure 3, the regions of Bulgaria are categorized into two specialisation groups, aligning with the findings on sector and ecosystem specialisations. The capital region is classified as **Creative digital/Capitals**, highlighting its distinctive strengths in the creative digital industries. On the other hand, the less densely populated regions in the north and east fall under the classification of **Agri-textile**, indicating their high specialisation in Agri-food and textile-related sectors.

The analysis suggests that the **sectoral and ecosystem composition as well as specialisation in Bulgaria's economy present a diverse range of prospects in various sectors** that can be leveraged to bolster regional growth through the support of economic and cluster structures. Said growth can be fostered through cross-border collaboration, in which clusters assume a pivotal role. The analysis has shown that Bulgaria is a mix between the more traditional Agrifood and Textile ecosystems and the digital ecosystem, which is predominant in the capital region. The latter is consistent with **Bulgaria's Smart Specialisation areas** (See Chapter 4), which identify Informatics and ICT as a priority area. The other priority areas of the Bulgarian Smart Specialisation Strategy address the Electronics, Health, Cultural and Creative Industry ecosystems.

Figure 3: Regional typology based on industrial ecosystem specialisation
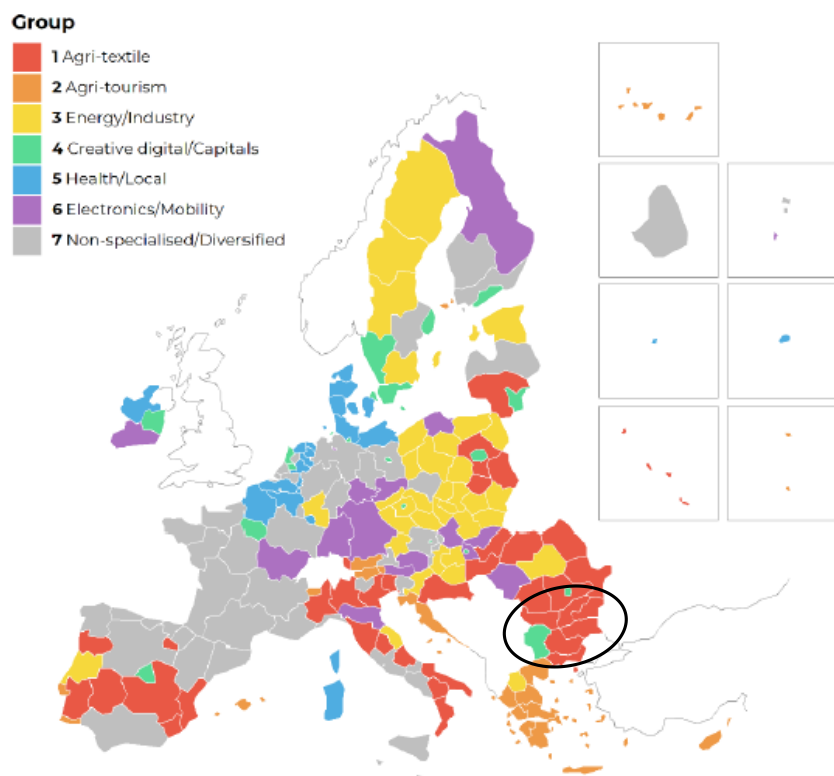
Source: European Cluster Panorama (2021).

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[13] 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 04.08.2023)

Innovation performance of Bulgaria

In the course of this paper, the economic performance of Bulgaria will be investigated in the context of clusters and how these are organised. As a fundamental pillar of the assessment of the innovation levels, one can look at the level of innovativeness in Bulgaria by employing information from the European Innovation Scoreboard (EIS). The **European Innovation Scoreboard (EIS)** is conducted annually to evaluate the research and innovation achievements of EU Member States and selected third countries, assisting them in recognizing areas of strength and weakness to improve their innovation performance. Member States are classified into four performance categories – Innovation Leaders, Strong Innovators, Moderate Innovators, and Emerging Innovators – based on their performance compared to the EU average.

Based on the most recent data from the European Innovation Scoreboard (EIS), **Bulgaria is classified as an "Emerging Innovator"[14]** with a summary innovation index score of 46.7. This score indicates that the country's innovativeness falls below the EU average. Over the past few years, Bulgaria's performance has improved, though at a slower rate than the EU as a whole. Consequently, the performance gap between Bulgaria and the EU average has widened. As shown in Figure 4, the lower innovation performance is evident when examining various indicators. Specifically, both R&D expenditures and non-R&D expenditures have underperformed relative to the EU average, with the latter experiencing a significant decrease in performance levels since 2016. Comparatively, R&D expenditures in the public and business sectors have remained somewhat stable.

Some areas showing **potential for improvement** according to the EIS. The shares of product innovators and business process innovators have seen significant growth over time. Additionally, innovative SMEs collaborating with each other, and public-private co-publications have shown promising improvement. Regarding digitalisation and the use of information technologies, both aspects are on an upward trend in Bulgaria. On the other hand, the country appears to perform above average in areas such as Trademark applications and Design applications, indicating strengths in these specific domains.

Figure 4: Innovation performance of Bulgaria in the European Innovation Scoreboard (2023)
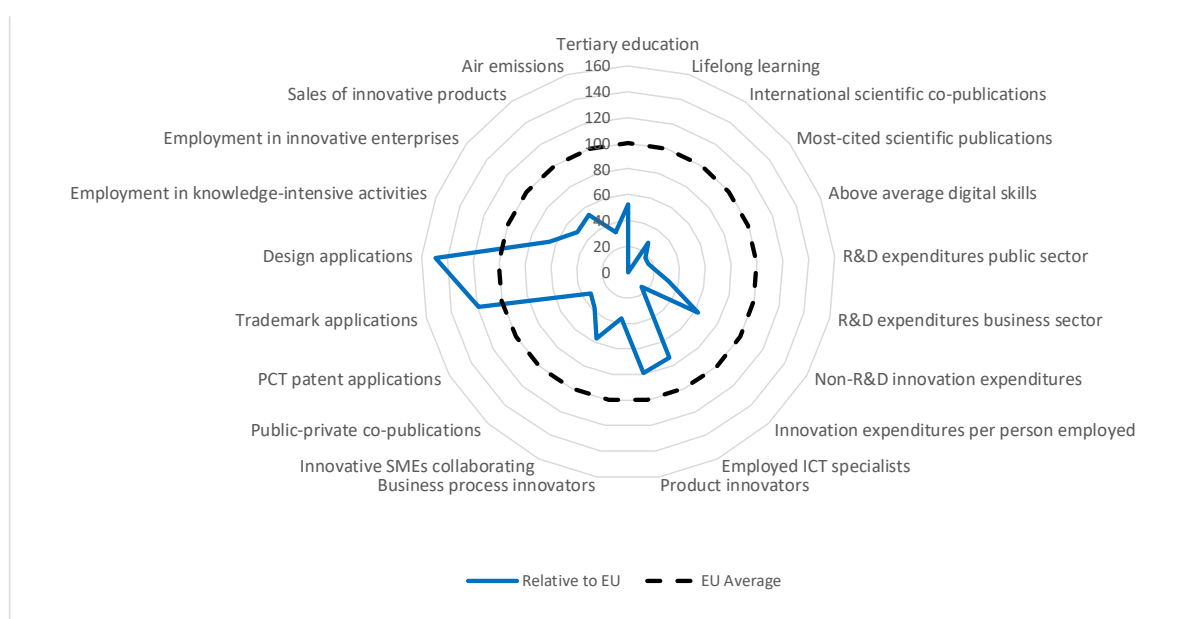
Source: European Commission (2023): European Innovation Scoreboard 2023.

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[14] The classification "Emerging innovator" implies that the region is found between 0% and 70% of the EU average.

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Regional competitiveness in Bulgaria

This section examines the regional competitiveness of Bulgaria based on the **Regional Competitiveness Index (RCI)**.[15] The RCI evaluates competitiveness across EU regions in three dimensions: the Basic Sub-Index, the Efficiency Sub-Index, and the Innovation Sub-Index. The findings aim to provide insights into Bulgaria's performance in these areas and identify opportunities for improvement.

Bulgaria's overall average score in the RCI is 65.9, falling below the EU average. However, the performances vary significantly among Bulgarian regions. The capital region stands out with a score of 85.4, surpassing both the country and EU averages. Conversely, other Bulgarian regions fall below the national average, ranging from 49.0 to 62.4, with the South-East region scoring 53.4.

When examining the sub-indexes of the different dimensions of the RCI, variations on the country's average can be observed. The efficiency sub-index is the highest-scoring dimension, largely driven by the capital region's performance. With a score of 102.3, it slightly outperforms the EU average. This success can be attributed to the region's strong performance in higher education, lifelong learning, and the labour market. Notably, Bulgaria's labour market outperforms the EU average.

On the other hand, the country average for the innovation sub-index is 44.5, which is below the EU average. Here again, the disparity between the capital region of South-West is evident, with the region demonstrating noteworthy performance in the innovation pillar, outperforming the EU average. Conversely, other regions in Bulgaria struggle to match the national average in terms of innovation.

Among all the regions in Bulgaria, the South-East region consistently underperforms in all sub-indexes. It ranks 227th out of 234 regions in the EU RCI, indicating its significant challenges in terms of regional competitiveness. Particularly in the pillars of technological readiness and innovation, the region ranks last among all regions in Bulgaria. However, it should be noted that the South-East region exhibits a relatively high score of 89.9 in the labour market pillar.

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Clusters in Bulgaria and their importance for regional economic development

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

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

Clusters in Bulgaria

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 Bulgaria on the ECCP gives the first impression of the intensity of organisation in regional industrial networks. Figure 5 below displays the geographical distribution of the cluster organisations in the region. Out of the total 1,142 registered EU-27 cluster organisations on the ECCP, there are **31 cluster organisations located in Bulgaria**. Broken down to the regions, South-West Bulgarian, which includes the capital city of Sofia, boasts the highest concentration of clusters. Its 21 cluster organisations make up two-thirds of all Bulgarian cluster organisations. Next, three regions each show three cluster organisations: South-Central Bulgaria, centred on Plovdiv (3); North-Central Bulgaria, centred on Ruse (3); and North-Eastern Bulgaria with cluster organisations in Varna (2) and Dobrich (1).

Figure 5: Overview of ECCP-registered cluster organisations and their regional and sectoral distribution in Bulgaria
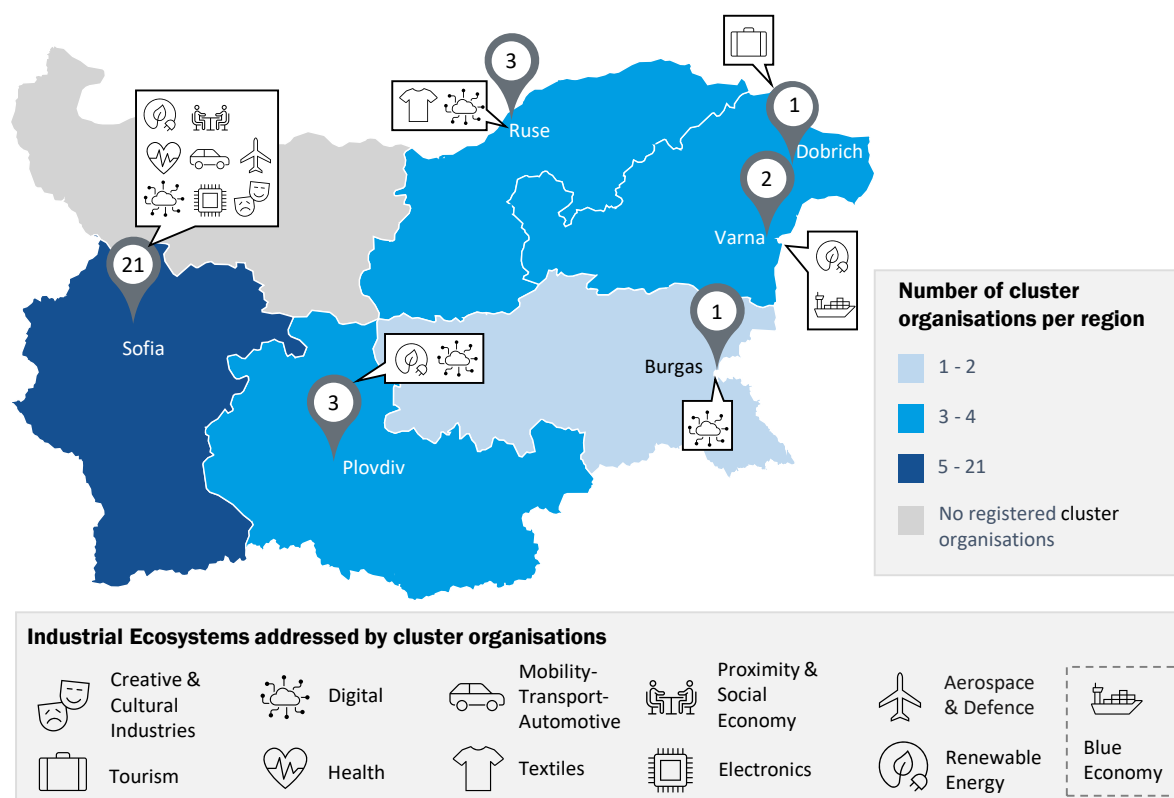
Source: ECCP (2023). Own elaboration based on https://reporting.clustercollaboration.eu/all; last accessed 26.07.2023. A full overview of the Bulgarian clusters is provided in Table 4 in the Annex. Note: The Blue Economy is not one of the official 14

Industrial Ecosystems as defined by the European Commission. However, it cannot be fitted into any one of them as the Blue Economy typically "encompasses all industries and sectors related to the oceans, seas and coasts, whether they are based directly in the marine environment (e.g. shipping, seafood, energy generation) or on land (e.g. ports, shipyards, coastal infrastructures)" (see https://www.marinecluster.com/en/info/what-is-a-blue-economy/, last accessed 28.07.2023).

The cluster organisations in Bulgaria can be related to **10 out of 14 EU industrial ecosystems**[16] (see also Table 4 in the Annex). The most prevalent industrial ecosystem is Digital with 12 cluster organisations, followed by Renewable Energy and Mobility-Transport-Automotive with five each. Electronics and Health cover three cluster organisations each,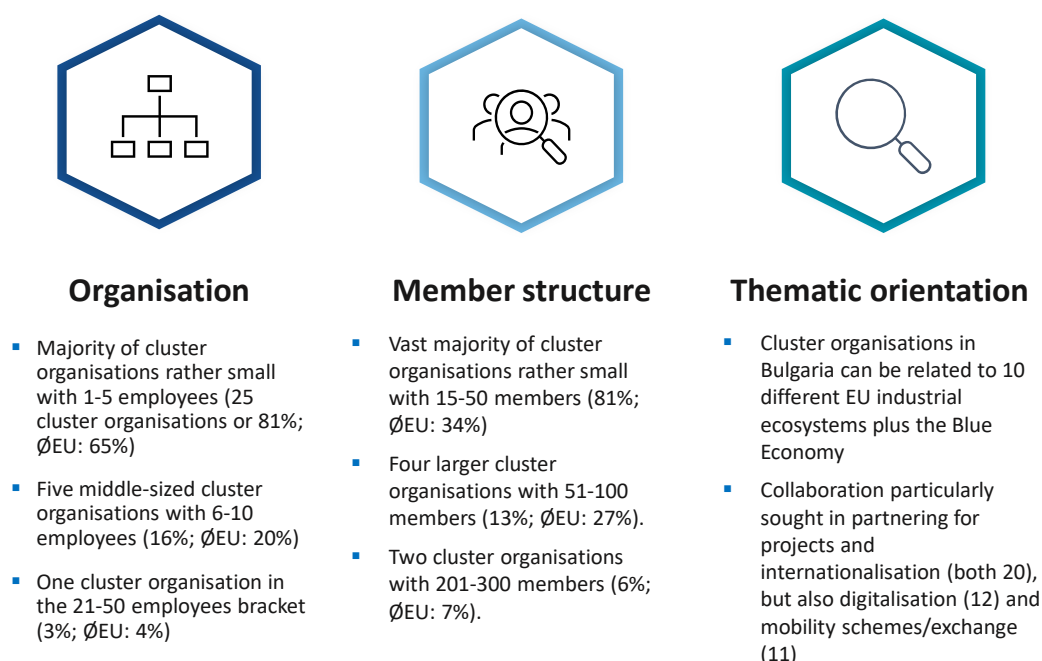 Creative & Cultural Industries and Textiles each two. Aerospace & Defence, Tourism, and Proximity & Social Economy are present in one cluster organisation each.[17]

Figure 6: Overview of organization, structure, and thematic orientation of ECCP-registered cluster organisations in Bulgaria

Organisation

- Majority of cluster organisations rather small with 1-5 employees (25 cluster organisations or 81%; ØEU: 65%)
- Five middle-sized cluster organisations with 6-10 employees (16%; ØEU: 20%)
- One cluster organisation in the 21-50 employees bracket (3%; ØEU: 4%)

Member structure

- Vast majority of cluster organisations rather small with 15-50 members (81%; ØEU: 34%)
- Four larger cluster organisations with 51-100 members (13%; ØEU: 27%).
- Two cluster organisations with 201-300 members (6%; ØEU: 7%).

Thematic orientation

- Cluster organisations in Bulgaria can be related to 10 different EU industrial ecosystems plus the Blue Economy
- Collaboration particularly sought in partnering for projects and internationalisation (both 20), but also digitalisation (12) and mobility schemes/exchange (11)

Source: ECCP (2023), data as of 26.07.2023.

As shown in Figure 6, cluster organisations in Bulgaria are **mostly small in size**. Regarding their **number of employees**, there is a significantly higher share of cluster organisations with up to five employees than it is the EU average. With regard to their **number of members**, the tendency becomes even more pronounced with 81 per cent of Bulgarian cluster organisations having a membership of 15-50 while in the EU overall, only 34 per cent fall into this bracket. By contrast, a larger share of EU cluster organisations has 51-100 members (27 per cent) as compared to the cluster landscape in Bulgaria (13 per cent). Bulgaria shows none of the very large cluster organisations with a membership of over 300 which make up eight per cent of all cluster organisations in the EU.

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[16] See the European Industrial Strategy. Available under: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-industrial-strategy_en (last accessed 31.07.2023).

[17] The numbers do not add up to the 31 total cluster organisations in Bulgaria as cluster organisations could indicate more than one industrial ecosystem.

Cluster organisations from Bulgaria **seek collaboration** primarily in the areas of partnering for projects and internationalisation (both 20), followed by digitalisation (12), mobility schemes/exchange (11), and technology scouting (10). Five Bulgarian cluster organisations have been awarded with the Bronze **Label of Cluster Excellence**, one with the Silver Label. Moreover, two have acquired the Going International (ESCP-4i) Label for European Strategic Cluster Partnership.

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[18], it does indicate how regions could earn greater public support, when certain industries have a local significance. Particularly indicators of R&D expenditures are key in measuring economic performance concerning innovation.

Figure 7 as seen below, one can see how **industries in Bulgarian regions** show an about average number of region-relevant specialisation nodes[19], but a high **number of cluster organisations** for South-West Bulgarian and an average to low number for the rest, in comparison to other European regions.

Figure 7: Distribution of region-relevant sector specialisation nodes and cluster organisations in the EU27
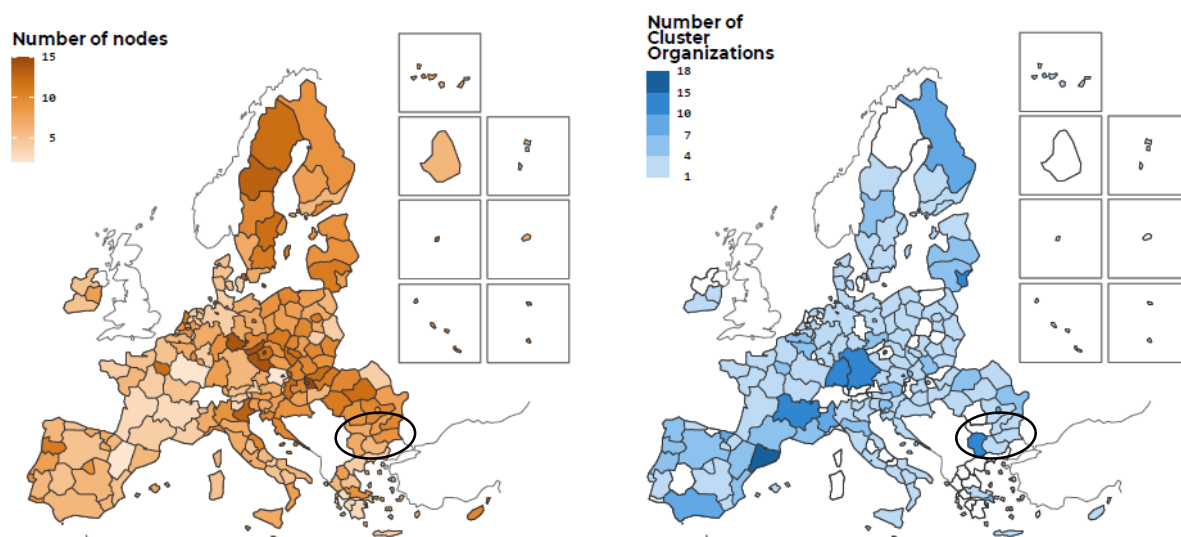
Source: ECCP (2023), own contribution based on Eurostat and ECCP data (May 2023).

Next to clusters having an enabling and facilitating effect on economic performance and growth, other studies have provided complementary information on the impact clusters can have. For example, Ketels & Protsiv (2021)[20] provide a thorough account of the **positive relationship between cluster presence and industry-level**

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[18] 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%).

[19] 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%).

[20] Ketels, C. & Protsiv, S. (2021): Cluster presence and economic performance: a new look based on European data,

wages across European regions. Key takeaways emphasise how particular clusters relate to sector-specific industries, as opposed to the mere "concentration of economic activity in a specific field" (p. 217). On top of that, the data showcases how the influence and strength of clusters have an independent relationship with economic outcomes. Their findings suggest how the degree and nature of competitiveness within clusters must be understood on a location-to-location basis. This further reflects on what they refer to as the "business environment quality" that can have striking knock-on effects on wage levels. Most importantly, Ketels & Protsiv delineate how "cluster strength" has a clear impact on "wages and prosperity".

A visual depiction that highlights this trend can be found in Figure 14 in the Annex. In the context of the Bulgarian regions, the statistical data and analysis of Ketels and Protsiv show a rather high cluster portfolio strength (share of payroll accounted for by strong clusters) but a mostly below-average cluster mix (bias towards cluster categories with higher wages). In other words, strong clusters are very important for wages in Bulgaria's regions but they are not necessarily in those sectors that account for particularly high wages when viewed across all European regions.

The remainder of this chapter will, first, look at the policy context for cluster development and, second, evaluate the success of cluster policy in strengthening regional economic development so far.

Bulgarian cluster policy dates back to 2004 when the **National Innovation Strategy prepared a first policy framework for cluster development**. Cluster support has since been developed within subsequent economic development policies: National Innovation Strategy (2004); National Strategy for Investments (2005-2010); National Cluster Strategy (2007-2013); OP Regional Development (2007-2013); National Strategy for the Promotion of SMEs (2007-2013), the Innovation Strategies for Smart Specialisation for the periods 2014-2020 and 2021-2027 and most recently adopted National Development Programme Bulgaria 2030.[21]

The cluster-related strategies and programmes generally aim at **supporting SMEs to deal with the competitive pressures of the EU Single Market**. The *National Innovation Strategy* (2004), for example, envisaged the development of clusters and the introduction of EU-adapted good practices. The *Innovation Strategy for Smart Specialisation 2014-2020* states that it will promote "the cooperation for research and technological development between business and the academic circles, as well as between enterprises, including clustering and participation in networks and platforms".[22]

Current developments show **continuing support for cluster development** in economic development policies. The *National Development Programme Bulgaria 2030* mentions clusters in two areas. First concerning the support for innovation networks, aiming at the "creation of innovation clusters, Centres of Competence, Centres of Excellence, Digital Innovation Hubs, Regional Innovation Centres, Centres for the Approbation of New Developments and Technology Parks" and , second, at "stimulating participation in projects for interregional cooperation and internationalisation of local enterprises/clusters in priority areas of [among others] the Innovation Strategy for Smart Specialisation."[23]

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 06.03.2023).

[21] See the ECCP Policy Factsheet Bulgaria. Available under: https://clustercollaboration.eu/sites/default/files/2023-06/ECCPfactsheet_Bulgaria_2022_final.pdf (last accessed 04.08.2023) and Slavova, I. & Bankova, Y. (2016): National Cluster Policy in Bulgaria: Nature and Main Characteristics, Journal of Varna University of Economics, 60:2, 185-200. Available under: https://ideas.repec.org/a/vrn/journl/y2016i2p185-200.html (last accessed 04.08.2023).

[22] Cited in Slavova & Bankova 2016, p. 192.

[23] Republic of Bulgaria, Ministry of Finance (2020): BULGARIA 2030 National Development Programme, Detailed Strategy. Available at: https://www.minfin.bg/en/1394 (last accessed 04.08.2023.), p. 24 & 26.

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The *Innovation Strategy for Smart Specialisation 2021-2027*[24] lines out current directions of development for Bulgarian clusters. It recognises the established presence of ICT clusters (p. 53; see also above, Figure 5), clusters' role in stakeholder participation (p. 61), clusters as important actors in priority thematic areas of smart specialisation (p. 69) like "clean technologies, circular and low-carbon economy" as well as "industry for a healthy life and biotechnology/bioeconomy" (p. 71). This will further be elaborated on in Chapter 4.

Evaluations of cluster-related development policies have shown mixed results so far. The 2010 evaluation of the *National Strategy for Regional Development (2005-2015)* showed poor progress in the cluster-related initiatives for increasing regional competitiveness in the knowledge economy. Only 6% of the budgeted amounts were paid out for projects, with some funds directed to projects not aligned with the Strategy's objectives.[25]

The macroeconomic model SIBILA 2.0 was used to assess ex-ante the impact of the *BULGARIA 2030 national development programme*. The results indicate that full implementation of these measures will have a strongly positive effect, leading to significant GDP growth of 33.4% by the end of 2030 compared to the baseline scenario. This growth will enable Bulgaria's economy to approach 75% of the average GDP level within the Union, supporting accelerated convergence of living standards as measured by the GDP per capita indicator.[26]

When it comes to the implementation of strategies that aim – among other aspects – on cluster development, Slavova and Bankova (2016) find that a strategic and institutional framework has been established. Financing, however, depends largely on European funds, which means that the Operational Programmes are the main vehicles for the implementation of any cluster support. Thereby, they find a "lack of focus" leading to an "extremely large number of emerging 'clusters' in Bulgaria, a number considerably exceeding that of many developed countries which possess experience in cluster development" (p. 196). To attain a more sustainable path for cluster development, they suggest integrating more ministries into the governance process of cluster support and setting a clearer focus for cluster financing.

In conclusion, Bulgaria has a **long-established integration of cluster support into economic development programmes** ever since preparing for the accession to the EU Single Market. Although the specific impacts are not always clear and policy efforts could be more focused, the growing cluster landscape, in particular in the ICT sector, is a visible outcome of Bulgaria's efforts in cluster development. The impact of the new national development programme BULGARIA 2030 and the Innovation Strategy for Smart Specialisation 2021-2027 remains will provide more evidence on the direction of Bulgarian cluster development. On a more general level, 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.

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[24] Republic of Bulgaria, Ministry of Innovation and Growth (2022): Innovation Strategy for Smart Specialisation 2021-2027. Available under: https://www.mig.government.bg/wp-content/uploads/2022/12/isis-2021-2027.pdf (last accessed 04.08.2023).

[25] Strategma Agency Ltd. and Republic of Bulgaria, Ministry of Regional Development and Public Works (2010). Interim evaluation and report on the implementation of the National Regional Development Strategy for the period 2005-2015.

[26] Republic of Bulgaria, Ministry of Finance (2020): BULGARIA 2030 National Development Programme, Detailed Strategy, p. 108-111.

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03

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

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3. Cross-border cooperation and the involvement of Bulgarian 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 a highly relevant activity for clusters to support sustainable growth and resilience-building of their SME members.[27] To gain an overview of the existing cross-border cooperation of Bulgarian clusters, a closer look will be taken in this chapter on their participation in European support initiatives, with a focus on the **2014-2020** funding period and on the Joint Cluster Initiatives ("Euroclusters") for Europe's recovery of the **2021-2027 funding period[28]**.

Figure 8: Overview of EU support initiatives in the funding period 2014-2020 and 2021-2027

Source: ECCP (2023)

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

In the 2014-2020 funding period, one relevant EU support initiative to increase cross-border cooperation of EU cluster organisations and other intermediary organisations was the European Strategic Cluster Partnership (ESCP) initiative, funded under the EU Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME). The ESCP established partnerships of European clusters and intermediary organisations from the different EU Member States or associated countries. These partnerships focused on three different thematic areas: internationalisation (ESCP for Going International, 4i), cluster excellence (ESCP for Excellence, 4x) and smart specialisation (ESCP for Smart Specialisation, S3).[29]

Overall, **nine Bulgarian cluster organisations participated in 15 ESCP projects** and requested grants for a combined value of around €760.000. More specifically, seven cluster organisations participated in nine ESCP-4i

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[27] 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 accessed 10.01.2023).

[28] For more information on the Euroclusters see: https://eismea.ec.europa.eu/funding-opportunities/calls-proposals/joint-cluster-initiatives-euroclusters-europes-recovery_en (last accessed on 10.01.2023).

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

(€460.000), five in ESCP-4x (€260.000), and one in ESCP-S3 (€40.000). The organisations represented disparate industrial sectors, such as, but not limited to, fashion, telecommunications, automotive, green energy and furniture. The figures below recap the participation of Bulgaria's clusters to the ESCP-4i and ESCP-4x iniativies.

Regarding the **ESCP-4i** (see Figure 9), seven Bulgarian cluster organisations have participated in nine project ESCP-4i projects. These mome ESCP-4i included European cluster partners from 16 different countries and had diverse thematic areas ranging from fashion, over telecommucations, furniture and green technologies to the automotive sector. Moreover, these ESCP-4i with Bulgarian cluster organisation involvement addressed diverse target markets for instance in Africa (Kenya, Uganda), Latin America (Bolivia, Peru) and North America (USA, Canada).

Figure 9: Profile of the cluster organisations participating in the ESCP – 4 going International initiative.
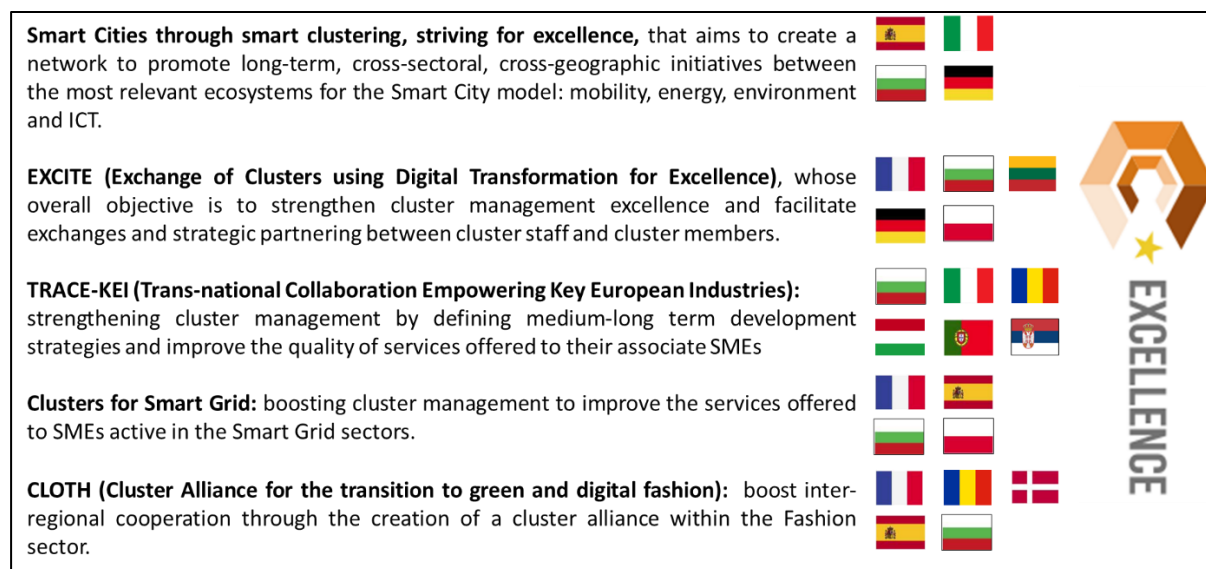

Source: ECCP (2023)

As regards the **ESCP-4x** (see Figure 10), seven Bulgarian clusters participated in 9 projects, with a thematic focus that spanned, amongst others, industries such as fashion, deep-tech, mobility and furniture. Bulgarian clusters

cooperated with partners from 16 different countries (AL, BE, CZ, DE, DK, ES, FR, HU, IT, MK, PL, PT, RO, RS, SE, SI).

Figure 10: Profile of the projects of the ESCP-4x initiative in which Bulgarian clusters participate

Smart Cities through smart clustering, striving for excellence, that aims to create a network to promote long-term, cross-sectoral, cross-geographic initiatives between the most relevant ecosystems for the Smart City model: mobility, energy, environment and ICT.

EXCITE (Exchange of Clusters using Digital Transformation for Excellence), whose overall objective is to strengthen cluster management excellence and facilitate exchanges and strategic partnering between cluster staff and cluster members.

TRACE-KEI (Trans-national Collaboration Empowering Key European Industries): strengthening cluster management by defining medium-long term development strategies and improve the quality of services offered to their associate SMEs

Clusters for Smart Grid: boosting cluster management to improve the services offered to SMEs active in the Smart Grid sectors.

CLOTH (Cluster Alliance for the transition to green and digital fashion): boost inter-regional cooperation through the creation of a cluster alliance within the Fashion sector.

Source: ECCP (2023)

Involvement of Bulgarian cluster organisations in the INNOSUP-1 initiative

In addition to the ESCPs, the **INNOSUP**-1 initiative "Cluster facilitated projects for new value chains" funded under the EU programme Horizon 2020 was a relevant EU support initiative that addressed the challenge to develop new cross-sectoral industrial value chains in Europe through European cooperation of cluster organisations and other relevant intermediaries.[30] The INNOSUP-1 initiative aimed at boosting the cross-sectoral and cross-border cooperation in consortia of European cluster organisations and other relevant innovation intermediaries.[31] An innovative approach of the INNOSUP-1 initiative was that it followed the so-called cascade funding approach, meaning that cluster organisations served as intermediaries to support their SME members through different support instruments like direct financial support or capacity-building training. Findings from the Evaluation Study of and Potential Follow-Up to Cluster Initiatives under COSME, H2020 and FPI of the European Commission (2021) confirm that the transnational component of the cluster initiatives was perceived by beneficiaries as an EU added value with high mutual learning effects for cluster organisations and the supported SMEs. Three cluster organisations from Bulgaria participated in the initiative, requesting grants for a combined amount of 9,256,844. EUR. The three projects[32] in question are:

1. *Manufacturing industry's novel digitalisation value chains for connecting machines with people, process and technology*, which aims to facilitate the cross-sectoral and cross-border support needed by manufacturing SMEs to test and adopt the latest digital technologies for the twin transition by establishing large-scale demonstrators to test different digital innovations;

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

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

[32] More information on the individual projects can be found here (1), here (2, Mine the gap), and here (3, UFO).

2. *Mine the gap*, that "seeks to bring together SMEs from the raw materials and mining sector with companies that have solutions for a more digital, greener, and circular mining value chain";

3. *UFO,* that "supports 65 European SMEs in the development of innovative products and services by integrating new technologcony solutions in Small Flying Objects (SFOs)".

Involvement in EU initiatives in the EU funding period 2021-2027 (Eurocluster)

With regards to 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.

Three different Bulgarian cluster organisations are participating in four different Euroclusters. In total, 22 partner organisations from 11 countries (AT, DE, ES, FR, IT, NL, PL, PT, RO, SE, SI) are involved in the four Euroclusters (see also Figure 11). More specifically:

- The Bulgarian cluster organisation "ICT cluster" is involved:

    1. In the **Silicon Eurocluster** project, which aims to bolster the resilience and adaptation of the European semi-conductor value chain.

    2. In the **Artificial Intelligence & BlockChain Eurocluster (AIBC)**, which supports the development of AI and BC solutions by European SMEs and start-ups.

- The "*green synergy*" cluster organisation participated in the **RE-CENTRE project**, which supports SMEs from the traditional furniture and living sector, the IT sector and the green/circular economy sector in the development of new business models to become more competitive.

- The "*Black sea energy cluster*" organisation participated in the **Architecture, Engineering and Construction (AEC) Eurocluster**, which supports the recovery of the SMEs in the aforementioned sector after the COVID-19 pandemic. The objective of the project is to boost inter-SME collaboration, accelerate the green and digital transformations and increase the social and economic resilience in and beyond the construction sector

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Figure 11: Overview of Euroclusters partnerships with involvement of cluster organisations from Bulgaria

AEC Eurocluster (Support SMEs along architecture, engineering, and construction value chains, to enhance the resilience and overcome hurdles of the COVID-19 pandemic)

AIBC (aims at further supporting the development of Artificial Intelligence & Blockchain solutions by European Single Market SMEs & start-ups)

Re-Centre (Supports SMEs from the traditional furniture & living sector, the IT sector and the green/circular economy sector in the development of new business models to become more competitive)

Silicon Eurocluster (aims to achieve greater European self-sufficiency, with increased competitiveness and resilience in the electronics value chain, with specific attention to SMEs)

Source: ECCP (2023), based on information from the Funding & Tenders Portal.

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04

Smart Specialisation in Bulgaria

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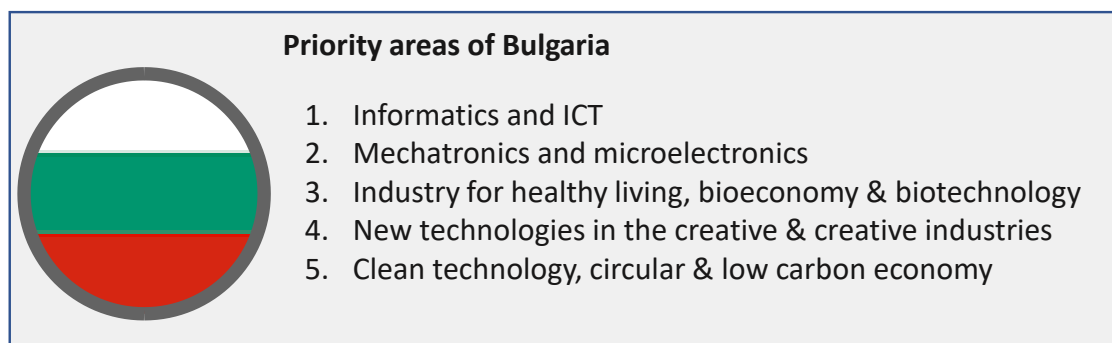**Strengthening the European economy through collaboration**

4.   Smart Specialisation in Bulgaria

Cluster organisations (can) play an important role in the design and implementation of Smart Specialisation Strategies (S3) since in both concepts, the facilitation of economic growth and competitiveness through regional proximity, are key elements. Box 1 provides some good practices of cluster involvement in S3 from other European regions and especially in the Entrepreneurial Discovery Process[33] (EDP). Against this background, this chapter focuses on Smart Specialisation in Bulgaria.

S3 of Bulgaria

A key starting point for the analysis of Smart Specialisation in Bulgaria is the Smart Specialisation Innovation Strategy 2021-2027[34]. This strategy was published by the Council of Ministers in December 2022. Cluster organisations play a central role in this Smart Specialisation Innovation Strategy 2021-2027. First, cluster organisations as key stakeholders were involved in the EDP that was used for developing the Bulgarian S3 2021-2027. For instance, the strategy highlights the role of Bulgarian cluster organisations in involving the private sector in a permanent dialogue with other relevant stakeholders. Moreover, the Bulgarian S3 2021-2027 mentions the objective of developing cross-border clusters as effective tools for the development of border regions and attracting investment.

Figure 12: Priority areas of the Bulgarian national S3 2021-2027

Priority areas of Bulgaria

1. Informatics and ICT
2. Mechatronics and microelectronics
3. Industry for healthy living, bioeconomy & biotechnology
4. New technologies in the creative & creative industries
5. Clean technology, circular & low carbon economy

Source: ECCP (2023).

The Bulgarian Smart Specialisation Innovation Strategy 2021-2027 identifies 5 different priority areas which are summarised in Figure 12 above. These priority areas address a wide range of topics ranging from "Informatics and ICT" over "Industry for healthy living, bioeconomy & biotechnology" to "Clean technology, circular & low carbon economy".

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[33] The entrepreneurial discovery is an interactive and inclusive process in which the relevant actors identify new and potential activities and inform the government. The government assesses this information and empowers those actors most capable of realising the potential. See https://s3platform.jrc.ec.europa.eu/edp (last accessed 18.07.2023).

[34] see https://www.strategy.bg/StrategicDocuments/View.aspx?lang=bg-BG&Id=1569 (last access 26.07.2023).

Box 1: Good practices of cluster involvement in S3

Good practices of cluster involvement in S3

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

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

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

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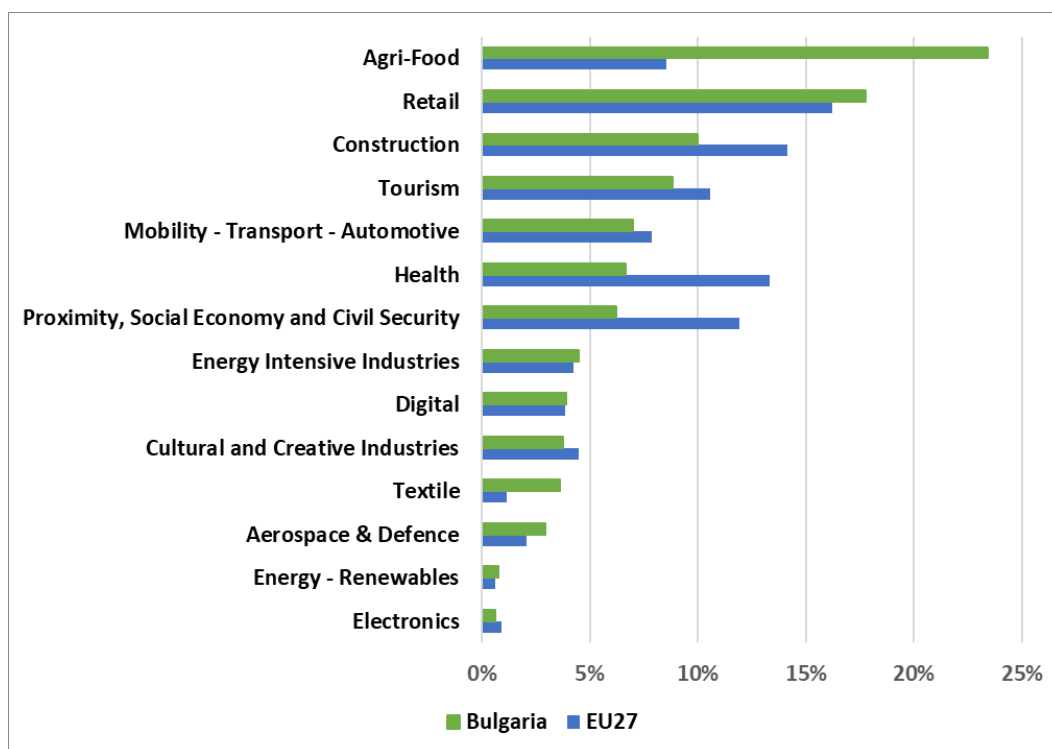
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Annex

Employment across the industrial ecosystems

Figure 13 presents the employment distribution among the 14 industrial ecosystems in Bulgaria and the EU 27. Notably, the Agri-Food Ecosystem stands out with the largest share of employment, accounting for 23.4% of the total employment across all industrial ecosystems, surpassing the EU average of 8.5%. Following closely is the Retail ecosystem, representing 17.8% of employment, which also exceeds the EU average of 16.2%. However, the Tourism Ecosystem's share of employment is 8.8%, falling below the EU27 average of 10.6%, indicating its importance for the Bulgarian economy. Apart from Agri-Food and Retail, other ecosystems showcasing a higher concentration of employment compared to the EU 27 average include Energy Intensive Industries, Textile, Aerospace & Defence, and Energy - Renewables. The Textile ecosystem particularly shines as its share in the national economy (3.6%) surpasses the EU27 level (1.1%). Meanwhile, the Digital ecosystem's share of employment (3.9%) mirrors the EU average (3.9%), with a substantial portion contributed by significant employment in the digital sector within the capital region of South-West, reaching 8.3% of the total employment across all industrial ecosystems, exceeding the EU27 average by 4.4%-points. The share of employment in the ecosystem Cultural and Creative is 3.8%, compared to the EU27 average of 4.5%. However, a closer look at the six Bulgarian regions reveals its prominence in the South-West region, with an employment share of 5.7%, exceeding both the country and EU27 averages.

Figure 13: Employment in the ecosystems

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

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Regional Innovation Scoreboard

Table 1: Key socio-economic and sectoral indicators of Bulgaria, the EU as well as the regions South-East (BG34) and South-West (BG41)

	BG	EU	BG34	BG41
GDP per capita (PPS)	18,600	32,600	14,600	31,100
GDP per capita growth (PPS)	6.4	4.4	3.1	6.9
Population density	62	106	52	103
Urbanisation	70.9	75.8	68.0	84.3
Population size (000s)	6,920	447,210	1,020	2,090
Share of employment in:				
Agriculture & Mining (A-B)	7.5	4.4	11.2	3.3
Manufacturing (C)	18.7	16.4	20.0	12.7
Utilities & Construction (D-F)	10.7	8.3	11.6	9.1
Services (G-N)	55.8	63.7	49.5	67.3
Public administration (O-U)	7.2	7.2	7.7	7.6
Average number of employed persons per enterprise	5.6	5.1	5.0	6.2

Source: European Commission (2023): Regional Innovation Scoreboard 2023.

Regional Employment Specialisation in Bulgaria

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

Region	Number of nodes	Node 1	Node 2	Node 3	Node 4	Node 5
BG31: North-West (Bulgaria)	7	A02 - Forestry & logging	C14 - Manuf. of wearing apparel	A01 - Crop & animal production	D35 - Electricity, gas & steam	C31 - Manuf. of furniture
BG32: North-Central (Bulgaria)	8	A02 - Forestry & logging	C14 - Manuf. of wearing apparel	A01 - Crop & animal production	C31 - Manuf. of furniture	C10 - Manuf. of food products
BG33: North-East (Bulgaria)	8	A02 - Forestry & logging	A01 - Crop & animal production	C14 - Manuf. of wearing apparel	C23 - Manuf. of other non-metal mineral products	F42 – Civil engineering
BG34: South-East (Bulgaria)	10	B05 - Mining of coal & lignite	A02 - Forestry & logging	A01 - Crop & animal production	D35 – Electricity, gas, steam and air conditioning supply	C14 - Manuf. of wearing apparel
BG41: South-West (Bulgaria)	8	C14 - Manuf. of wearing apparel	N80 - Security, investigation activities	J61 - Telecommunications	J62 – Computer programming, consultancy	M74 - Other prof., scientific,

					and related activities	techn. activities
BG42: South-Central (Bulgaria)	6	A02 - Forestry & logging	C14 - Manuf. of wearing apparel	A01 - Crop & animal production	C22 – Manuf. of rubber and plastic products	C27 - Manuf. of electrical equipment

Source: ECCP (2022), own elaboration based on data from Eurostat.

Table 3: Number of regionally relevant ecosystem nodes in Bulgaria

Region	Number of ecosystem nodes	Node 1	Node 2	Node 3
BG31: North-West (Bulgaria)	2	Textile	Agri-Food	-
BG32: North-Central (Bulgaria)	2	Textile	Agri-Food	-
BG33: North-East (Bulgaria)	2	Agri-Food	Textile	-
BG34: South-East (Bulgaria)	2	Agri-Food	Textile	-
BG41: South-West (Bulgaria)	3	Textile	Digital	Aerospace & Defense
BG42: South-Central (Bulgaria)	3	Textile	Agri-Food	Energy-Intensive Industries

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

List of cluster organisations in Bulgaria

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

N°	Cluster organisation	Industrial Ecosystem	Website
1	**AI Cluster Bulgaria**	**Digital, Electronics**	www.aicluster.bg
2	**Association for innovation, business excellence, services and technology**	**Digital**	aibest.org
3	**Cluster for development and training of doctors in dental medicine**	**Health**	www.nanoacademycluster.bg
4	**Automotive Cluster Bulgaria**	**Mobility-Transport-Automotive**	automotive.bg
5	**Black Sea Energy Cluster**	**Renewable Energy**	www.bsecluster.org
6	**Bulgarian Branch Association Polymers**	**Mobility-Transport-Automotive**	bap.bg
7	**Bulgarian Digital Cluster**	**Digital**	www.digitalcluster.eu
8	**Bulgarian Fashion Association**	**Textiles**	www.bgfa.eu
9	**Bulgarian Fintech Association**	**Digital**	fintechbulgaria.org
10	**Bulgarian Furniture Cluster**	**Creative & Cultural Industries**	www.furnitureclusterbg.com
11	**Cleantech Bulgaria**	**Renewable Energy, Digital**	cleantech.bg
12	**Cluster Aero-Space Technologies, Research and Applications/ CASTRA**	**Aerospace & Defence**	castra.org
13	**Cluster for Digital Transformation and Innovations**	**Digital**	dticluster.org/
14	**Cluster Green Transport**	**Mobility-Transport-Automotive, Renewable Energy**	gtcluster.eu

15	Cluster Hoisting Devices LTD.	Mobility-Transport-Automotive	www.hoists-bulgaria.com
16	Cluster Mechatronics and Automation	Electronics	www.cluster-mechatronics-automation.com
17	Cluster of information and communication technologies Burgas	Digital	ictc-burgas.org
18	Cluster Sofia Knowledge City	Digital, Creative & Cultural Industries, Proximity & Social Economy	www.knowledgesofia.eu
19	Culinary Arts and Hospitality Association	Tourism	culinary-arts.bg
20	Digital Health and Innovation Cluster Bulgaria	Health	dhicluster.bg
21	E-Business Cluster	Digital	e-cluster.eu
22	Electric vehicles industrial cluster	Mobility-Transport-Automotive	www.emic-bg.org
23	Green Synergy Cluster	Renewable Energy	greensynergycluster.eu
24	Health and Life Sciences Cluster Bulgaria	Health	www.biocluster.bg
25	ICT Cluster	Digital	www.ictcluster.bg
26	ICT Cluster Plovdiv	Digital	www.ictc-plovdiv.org
27	Industrial Cluster Srednogorie	Electronics	srednogorie.eu
28	Innovative cluster Simulation models in medicine	Digital	smm-cluster.com
29	Marine Cluster Bulgaria	(Blue Economy)	www.marinecluster.com
30	Renewable Energy Sources Cluster	Renewable Energy	www.res-cluster.com
31	Specialized Cluster and Institute for Apparel and Textile - Danube	Textiles	www.sciat.eu

Source: ECCP (2023) and own adaptations, data retrieved on 26.07.2023. Note: The Blue Economy is not one of the official 14 Industrial Ecosystems as defined by the European Commission. However, it cannot be fitted into any one of them as the Blue Economy typically "encompasses all industries and sectors related to the oceans, seas and coasts, whether they are based directly in the marine environment (e.g. shipping, seafood, energy generation) or on land (e.g. ports, shipyards, coastal infrastructures)" (see https://www.marinecluster.com/en/info/what-is-a-blue-economy/, last accessed 28.07.2023).

Strengthening the European economy through collaboration

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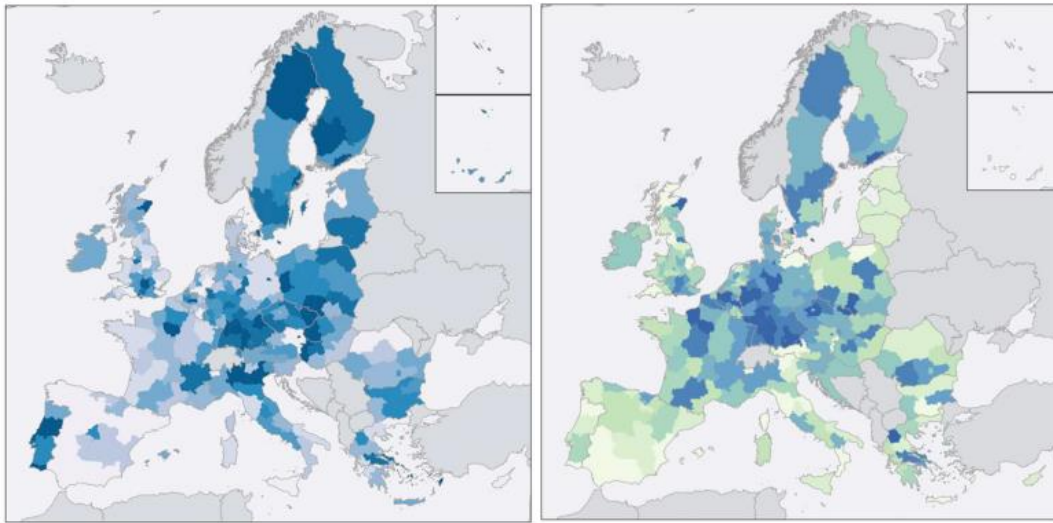
Source: Ketels & Protsiv (2021): Cluster presence and economic performance: a new look based on European data.
Note: Colours refer to deciles of the corresponding variables such that darker colours indicate higher values.

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Overview of the industrial ecosystems

Figure 15: EU industrial ecosystems based on the European industrial strategy

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

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

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