EUROPEAN CLUSTER COLLABORATION PLATFORM

Clusters meet Regions' event in Heilbronn "Transformation of the manufacturing industry: The path towards Artificial Intelligence and Hydrogen"

Input paper

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Executive Summary

The following paper presents observations on the clusters landscape in Baden-Württemberg 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 Baden-Württemberg

- The German state of Baden-Württemberg accounts for 14.8% of the German gross domestic product with €622.1 billion. In 2024, the region's exports reached €241.1 billion, led by the vehicle industry and machinery, albeit a recent decline reflects global economic challenges.
- The state's economy is characterised by a strong manufacturing sector, contributing significantly to the state's gross value added. The strength of the automotive sector of the state is also reflected in its employment structure, where the Mobility-Transport-Automotive ecosystem significantly surpasses both the national and EU27 average.
- In the 2023 Regional Innovation Scoreboard, all four administrative districts of Baden-Württemberg have been classified as either "Innovation Leader" or "Strong Innovator" with all of them scoring above national and EU27 averages.

Clusters in Baden-Württemberg and their importance for regional economic development

- Out of the ECCP-registered 138 cluster organisations active in Germany, there are 27 ECCP-registered cluster organisations in the state of Baden-Württemberg, making it the state with the second highest number of cluster organisations registered on the ECCP. These cluster organisations span 11 of the 14 industrial ecosystems. However, as the ECCP only includes clusters with validated profiles, it does not capture the full cluster landscape of Baden-Württemberg. The database of the RegioClusterAgentur BW entails 78 cluster initiatives across the state's economic regions. In the economic region of Heilbronn-Franken, there are two active cluster organisations, TransformotiveDIALOG and Packaging Valley.
- Baden-Württemberg has developed a comprehensive cluster policy framework, implemented by the RegioClusterAgentur BW, which links clusters with regional innovation systems, facilitates industrial transformations and encourages cross-clustering. At the subregional level, this approach manifests itself in Heilbronn's TransformotiveDIALOG. The research and education campus of the Schwarz Bildungscampus serves as a nucleus for new high-tech development.

Cross-border cooperation and the involvement of Baden-Württemberg's clusters in European networks and support initiatives

- Cluster organisations from Baden-Württemberg have been actively involved in 11 European Strategic Cluster Partnerships (ESCP). These ESCPs, supported by the European Commission, have strived to help cluster members to face global competition, by supporting interregional activities for joint innovation and investment projects and facilitating access to other countries & regions in the EU and internationally. In Baden-Württemberg, three cluster organisations have participated in 6 ESCP for Internationalisation (ESCP-4i) projects. These projects focused on various topics, including digital, automotive, agri-food and green industry. Furthermore, five cluster organisations from the state participated in five ESCP-4x projects.
- Euroclusters also play an important role in Baden-Württemberg's innovation landscape. Three cluster organisations in the state hold key positions in the POLREC, AIBC Eurocluster and BioMan4R2 Eurocluster, focus on supporting green and digital transition, health innovation, AI and Blockchain applications, sustainable industrial practices, and competitiveness.

Smart Specialisation in Baden-Württemberg

- Smart Specialisation (S3) is a strategic approach developed by the European Commission that requires regions to identify and leverage their unique strengths and capabilities to foster innovation-driven economic growth. The S3 2021-2027 identifies five priority areas: Digitalisation, AI & Industry 4.0, Sustainable Mobility, Healthcare, Resource Efficiency & Energy Transition, and Sustainable Bioeconomy.
- Cluster organisations play a central role in the governance and implementation of Baden-Württemberg's S3, fostering collaboration between industry, research institutions, and government stakeholders. Clusters such as those active in AI, hydrogen technologies, and life sciences drive sector-specific innovation through strategic projects like AI TRAQC, INNO4CFIs, and the I^3 Lab. These initiatives enhance technology transfer, accelerate the adoption of advanced solutions, and position Baden-Württemberg as a highly competitive region in key industrial transitions.

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Context: Economic profile of Baden-Württemberg

1. Context: Economic profile of Baden-Württemberg

The state of Baden-Württemberg, located in southern Germany, occupies an important position in the nation's economic and industrial landscape. Bordered by France to the west and Switzerland in the south while sharing regional borders with the German states of Rheinland-Pfalz, Hessen, and Bavaria, Baden-Württemberg serves as a central hub for commerce and industry within Germany, especially in the realm of manufacturing. As of 2024, Baden-Württemberg was home to approximately 11.2 million people, representing about 13.5 % of Germany's total population, ranking it as the third most populous state in the country after North Rhine-Westphalia and Bavaria.[1] The state of Baden-Württemberg is further divided into four administrative districts ("Regierungsbezirke"), which include Stuttgart, Karlsruhe, Freiburg and Tübingen. The city of Heilbronn is located in the administrative district of Stuttgart and is part of the Heilbronn-Franken[2] economic region, which is one of 12 economic regions ("Wirtschaftsregionen").[3] The Clusters meet Regions event will focus on strengthening and connecting the regional innovation ecosystem in the key areas of Heilbronn-Franken, which include Automotive & Logistics, Manufacturing, Artificial Intelligence and Hydrogen.

The following section will provide a concise socio-economic overview of Baden-Württemberg, encompassing key aspects such as its macroeconomic profile and sectoral specialisation, as well as its innovation and regional competitiveness performances.

Macroeconomic profile of Baden-Württemberg

Baden-Württemberg ranks as the third largest state in Germany in terms of GDP. In 2023, the gross value added (GDP) of Baden-Württemberg reached approximately €622.1 billion, accounting for roughly 14.8% of German GDP.[4] The economy of Baden-Württemberg has faced stagnated growth over the last few years. Since the economic crisis due to the COVID-19 pandemic in 2020, the state has not been able to achieve real economic growth. The stagnation is in line with the economic performance of Germany. The per capita GDP (PPS) of Baden-Württemberg in 2023 stood at €49.100, surpassing the EU27 average as well as the German average.[5] This positioned Baden-Württemberg fifth among German states, trailing after the states of Hamburg, Bavaria, Bremen and Hesse.

In terms of gross value added (GVA), Baden-Württemberg contributed approximately 14.9% of Germany's added value in 2023, with the services sector accounting for 42.8% in 2022, while the manufacturing sector accounted for 30.5% (2022), significantly higher than the national and EU27 average of 20.3% and 16.6%.[6] At the heart of Baden-Württemberg's manufacturing dominance is the automotive industry, a cornerstone of the regional economy. Home to around 300 automobile companies and approximately 1,000 suppliers, the sector generates

[1] Eurostat (2025): Population on 1 January by age, sex and NUTS 3 region.(last access 11.03.2025).
[2] Also known as Heilbronn-Franconia.
[3] These economic regions include Stuttgart, Heilbronn-Franken, Ostwürttemberg, Mittlerer Oberrhein, Rhein-Neckar, Nordschwarzwald, Südlicher Oberrhein, Schwarzwald-Barr-Heuberg, Hochrhein-Bodensee, Neckar-Alb, Donau-Iller, Bodensee-Oberschwaben.
[4] Eurostat (2025): Gross domestic product (GDP) at current market prices by NUTS 2 regions. (last access 11.03.2025).
[5] ibid.
[6] Eurostat (2025): Gross value added at basic prices by NUTS 3 regions. (last access 19.03.2025).

an annual turnover exceeding €135 billion. [7] With nearly half a million jobs linked to the automotive industry, it serves as a key driver of innovation, employment, and economic growth in the state.[8]

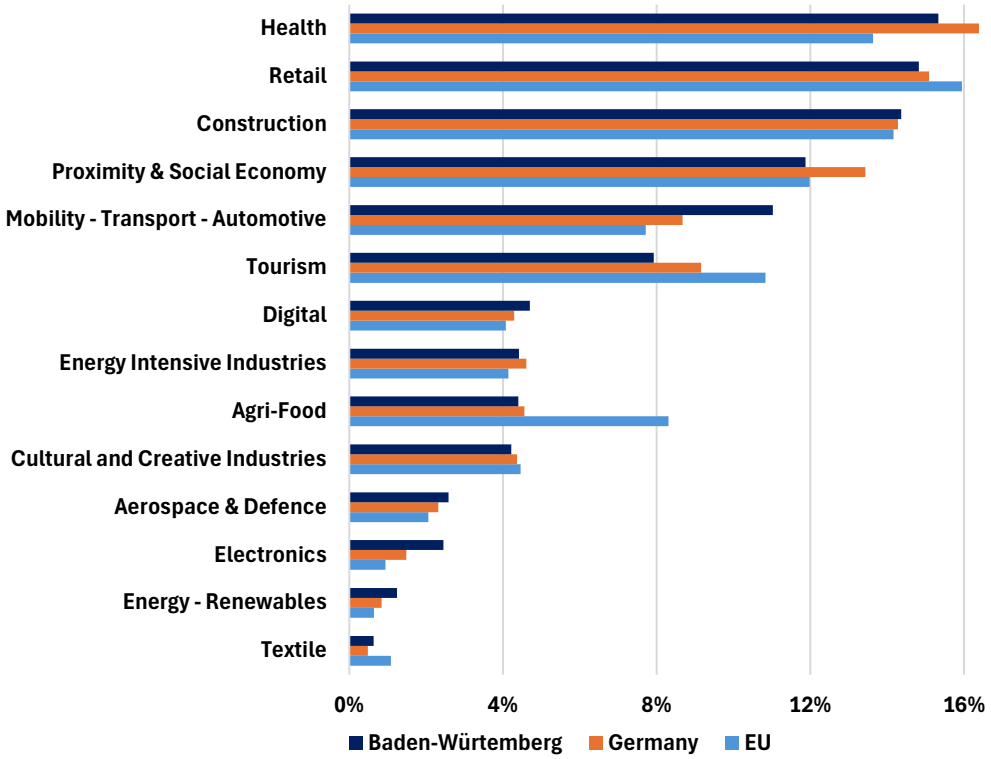
The state of Baden-Württemberg also serves as an important hub for trade. In 2024, the region's exports totalled €241.1 billion, constituting 15.5% of Germany's total exports.[9] However, exports decreased by 3.7% from 2023-2024, while German exports declined by 1.2%. Therefore, the overall decline in German exports was only just under a third as strong as that of the export-oriented Baden-Württemberg state. EU27 countries remain Baden-Württemberg's most significant trading partners, accounting for 47.6% of the exports. Outside the EU27 countries, the United States remains the most important trading partner, accounting for 14.4% of the exports, followed by Switzerland (8.4%). The strongest export sector in Baden-Württemberg is the vehicle industry, accounting for 21.5% of all exports, although it is facing a strong decline of 11% compared to 2023. The machinery industries follow closely behind with 19.7% of total exports as well as the pharmaceutical industry with 11.3%. Both sectors also faced a decline compared to 2023. Notably, the sectors that saw the most significant increases in exports from 2023 to 2024 were metals (26.4%) and food & animal feed (8.5%).

Baden-Württemberg sector specialisations and employment levels

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. The classification of the 14 industrial ecosystems has been calculated by aggregating NACE 2-digit activities, following the methodology established by the European Commission. As shown in Figure 1, the Health ecosystem is the ecosystem with the highest employment share across all ecosystems in Baden-Württemberg, with 15.3%. While it surpasses the EU27 average of 13.6%, it lies below the national average (16.4%). The Retail ecosystem follows this at 14.8% (compared to 15.9% at the EU27 level and 15.1% at the national level) and Construction at 14.4%, slightly above the EU and national average. As mentioned before, for the state of Baden-Württemberg the Automotive sector is of great importance. This is also reflected in the high employment share of the Mobility - Transport – Automotive ecosystem (11%), which is significantly higher than the national (8.7%) and EU27 average (7.7%). Other ecosystems that demonstrate a higher concentration of employment compared to the national and EU27 average include Digital, Aerospace & Defence, Electronics and Energy - Renewables.

[7] Baden-Württemberg (2025): Innovations- und Zukunftsagenda Baden-Württemberg. (last access 20.03.2025).
[8] ibid.
[9] Statistik BW (2025): Baden-Württembergs Exporte (last access 19.03.2025).

Figure 1: Employment across the industrial ecosystems for Baden-Württemberg, Germany and the EU27, in 2022



Source: ECCP (2025), own elaboration based on Eurostat.

Regional competitiveness level of Baden-Württemberg

To provide an overview of Baden-Württemberg's performance in key dimensions of regional competitiveness, the ranking of the state in the Regional Competitiveness Index (RCI) is presented, as shown in Figure 10 in the Annex.[10] This index measures key aspects of competitiveness among regions across the EU according to three dimensions: the Basic Sub-Index, the Efficiency Sub-Index, and the Innovation Sub-Index.

The overall regional competitiveness score of the four administrative districts (NUTS 2) in Baden-Württemberg ranges from 113.3 to 126.5, placing them all above the EU average (EU=100). The districts of Stuttgart (123.5) and Karlsruhe (126.5) score above the national average (117.3), while the districts of Freiburg (113.3) and Tübingen (116.6) score below the national average. In the basic sub-index, the state of Baden-Württemberg displays strong scores in the macroeconomic pillar. While the district of Karlsruhe excels in the infrastructure pillar, the district of Stuttgart performs above the national and EU average in the health pillar.

In the efficiency sub-index, three of the four districts score above the national and EU average, while Freiburg scores below the national average but surpasses the EU average. Karlsruhe (190.8) and Stuttgart (185.7) excel in the pillar market size, which is nearly double the EU average, showcasing large and accessible markets. Tübingen and Freiburg, on the other hand, still score considerably higher than the EU average but fall behind the national

[10] European Commission (2022): EU Regional Competitiveness Index 2.0 - 2022 edition. (last access 19.03.2025).

average of 155.3. Regarding the labour market, Tübingen showcases the highest score in Baden-Württemberg with 126.1.

In the innovation sub-index, all provinces in Baden-Württemberg outperform the EU average and, besides Freiburg, the national average. Karlsruhe emerges as the top performer, driven by strong scores in the technological readiness, business sophistication and innovation pillars. Stuttgart follows closely, with comparable results in technological readiness and the highest score in innovation, highlighting its ability to foster innovation through collaboration and entrepreneurship. The pillar of business sophistication is showing room for improvement; besides Karlsruhe, all districts score below the national average, with Freiburg and Tübingen also scoring below the EU average.

Regional innovation performance and landscape of Baden-Württemberg

The following subchapter first reviews the Regional Innovation Scoreboard to assess the regional innovation performance of Baden-Württemberg, with a particular focus on the administrative district of Stuttgart, where the Heilbronn-Franken economic region is located. Second, additional sources are used to explore broader aspects of the regional innovation landscape in Baden-Württemberg as well as the Heilbronn-Franken economic region, including research and development (R&D) infrastructure, innovation hubs, and flagship initiatives aimed at strengthening innovation ecosystems across the state.

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 either the NUTS 1 or NUTS 2 levels.[11] It is important to note that for Baden-Württemberg, the data from the RIS is provided at the administrative district (NUTS 2) level, therefore, each of the four administrative districts of the state has an individual score. The strongest Innovator of Baden-Württemberg is Karlsruhe, which is ranked as an "Innovation Leader" with a Regional Innovation Index (RII) score of 142.4 (EU27=100), followed by Tübingen (130.6) and Stuttgart (126.4), which are also listed as "Innovation Leader**".** [12] The district of Freiburg has the lowest RII score of the state (124.9) but is still above the German (117.8) and EU27 (100) average and is classified as a "Strong Innovator".

In this section, the regional innovation of Stuttgart will be reviewed in detail (see Figure 10 in the Annex), since the economic region Heilbronn-Franken is located in it. Over time, the innovation performance of Stuttgart has increased by 2.8% since 2016. The district exhibits several considerable strengths within its innovation ecosystem. Within the realm of publication, the district shows a strong collaboration between public institutions and private enterprises, as reflected in the "Public-private co-publications" indicator, surpassing the national and European average. This achievement suggests effective translational activities between research and practical application, as well as strong global research ties and high-quality research, enhancing the region's innovation output. Regarding R&D, the district surpasses the EU and German averages in the "R&D expenditures business sector". In the field of intellectual property, Stuttgart excels as indicated by high scores in the "Design Applications" and "PCT patent applications" indicators compared to the EU and German average. Furthermore, employment in highly productive sectors is represented by "Employment knowledge-intensive activities", "Employment innovative enterprises", and "Employment ICT specialists", where the region outperforms the EU

[11] EU Commission (2023): Regional Innovation Scoreboard 2023 – Methodology Report. Available under: https://research-and-innovation.ec.europa.eu/document/download/5357c81b-9222-464b-8468-38ccd83b5624_en?filename=ec_rtd_ris-2023-methodology-report.pdf%20 (last access 20.03.2025).
[12] EU Commission (2023): Regional Innovation Scoreboard 2023 – Germany. Available under: https://ec.europa.eu/assets/rtd/ris/2023/ec_rtd_ris-regional-profiles-germany.pdf (last access 20.03.2025).

and German averages. Other indicators where Stuttgart performs better than the EU and German average are "Tertiary education" and "Business process innovators".

Stuttgart's innovation ecosystem, while showing considerable areas of strength, also displays several indicators pointing to potential areas for improvement when compared to the German and EU27 averages. According to the score of the RIS, the region seems to encounter challenges, such as in the area of digital transformation. The region has "Digital skills" below German and EU27 averages. Also, it seems that the region could improve cross-innovation by promoting collaboration between SMEs as the indicator of "Innovative SMEs collaborating" performs below EU27 and German averages. Regarding scientific publications, the region has room for improvement with the "International scientific co-publications" and "Most-cited scientific publication" indicators both being below the German and EU27 average.

Overall, Baden-Württemberg is widely recognised as Germany's most innovative state. In a recent international comparison of 121 regions across Austria, Germany, Hungary, Italy, Poland, Sweden, and the United States, Baden-Württemberg ranked third overall, and ranked top in Germany.[13] The strong innovation ecosystem of Baden-Württemberg can be attributed to the strong R&D infrastructure. R&D expenditure in Baden-Württemberg is one of the highest in the world at 5.6% of GDP.[14] Besides the high R&D spending, R&D employment is another important enabler of Innovation. In Baden-Württemberg, R&D employment accounts for 2.9% of total employment, significantly higher than in other innovative states like Bavaria (2%) or Berlin (1.8%).[15] The strong innovation infrastructure is reflected in the number of patent applications, with the state of Baden-Württemberg accounting for the most patent applications in Germany (38.7%).[16]

The state's innovation ecosystem is further strengthened by a dense network of innovation centres and hubs across Baden-Württemberg, which translate scientific excellence into practical applications and foster collaboration across sectors. Notable examples include:

- **Innovation Campus Future Mobility (ICM)**, which promotes sustainable and efficient transport and production technologies. At its core is a collaboration between research teams from the University of Stuttgart and the Karlsruhe Institute of Technology aimed at accelerating innovation.[17]
- **Cyber Valley,** a centre for excellence in AI and modern robotics that fosters collaboration and knowledge exchange between science, business, and society.[18]
- **Quantum BW**, which connects research and industry to advance quantum technologies in Baden-Württemberg. It brings together a broad range of stakeholders to build a strong quantum technology ecosystem.[19]

Within Baden-Württemberg, the economic region of **Heilbronn-Franken, particularly the city of Heilbronn, stands out as an important innovation location**. Over the past years, it has developed a growing high-tech ecosystem, shaped by close collaboration between public and private actors. A notable example is the **Innovation Park for Artificial Intelligence (IPAI)** located in Heilbronn. This innovation park aims to foster collaboration between leading AI experts from industry and research. Additionally, IPAI aims to educate the public about AI, promoting awareness and accessibility to discussions and learning opportunities. [20] The development of IPAI is

[13] GIPTA (2022): The Transatlantic Subnational Innovation Competitiveness Index (last access 20.03.2025).
[14] Baden-Württemberg (2025): Innovations- und Zukunftsagenda Baden-Württemberg. (last access 20.03.2025).
[15] Bundesbericht-Forschung-Innovation (2025): FuE-Personal: Gesamt. (last access 20.03.2025).
[16] DPMA (2025): Aktuelle Statistiken: Patente. (last access 31.03.2025).
[17] For more information, see https://www.icm-bw.de/ (last access 31.03.2025).
[18] For more information, see https://cyber-valley.de/ (last access 31.03.2025).
[19] For more information, see https://www.quantumbw.de/en/ (last access 31.03.2025).
[20] For more information, see https://ip.ai/en/ (last access 31.03.2025).

largely financed by the Dieter Schwarz Stiftung, highlighting the strong commitment of the private sector to regional innovation. The park will also host the **Advanced Chip Design Accelerator (ACDA)**, a competence centre of the Interuniversity Microelectronics Centre (imec), a world-leading research and innovation hub in nanoelectronics and digital technologies. The ACDA will focus on developing advanced chiplet, packaging, system integration, sensor, and edge AI technologies. It will complement imec's existing automotive R&D efforts and support the local and international automotive industry by minimising risks and accelerating the production of automotive chiplets.[21] The establishment of the competence centre in Heilbronn is expected to strengthen the region's position as a technology location and provide valuable impetus for the innovation-driven transformation of the automotive sector.

This technological infrastructure is closely linked to the region's strong academic environment. The **Bildungscampus Heilbronn**, also financed by the Dieter Schwarz Stiftung, has gathered a strong portfolio of research and academic institutions. Next to two Fraunhofer research institutes[22], there are external campuses of the Technical University of Munich (TUM) and the ETH Zurich, the Heilbronn University of Applied Sciences, as well as a range of other schools, business institutes, and educational initiatives.[23] Further recognition of the region's innovation potential is reflected in its selection to participate in the **MIT Regional Entrepreneurship Acceleration Programme (REAP)**, alongside seven other selected regions.[24] The Heilbronn REAP team brings together a broad group of stakeholders from academia, business, venture capital, startups, and government. The two-year initiative focuses on fostering innovation-driven entrepreneurship in regional innovation ecosystems and offers a valuable platform for international exchange and collaboration.

[21] For more information, see https://www.imec-int.com/en/press/baden-wurttemberg-attracts-imec-lead-development-chiplet-based-technology-automotive (last access 03.04.2025).
[22] These include the Fraunhofer Institute for Industrial Engineering (IAO) and the Fraunhofer Institute for Systems and Innovation Research (ISI).
[23] For more information, see https://bildungscampus.hn/ (last access 03.04.2025).
[24] MIT REAP (2025): Heilbronn – Franconia Cohort 11. (last access 20.03.2025).

02

Clusters in Baden-Württemberg & their importance for regional economic development

EUROPEAN CLUSTER COLLABORATION PLATFORM

Strengthening the European economy through collaboration

2. Cluster organisations in Baden-Württemberg and their importance for regional economic development

The involvement of clusters in regional economic governance, policy design, and implementation is of central importance for regional economic development. This chapter provides an overview of cluster organisations in Baden-Württemberg, including their geographic distribution and key characteristics such as size, membership structure, and thematic orientation based on industrial ecosystems. While the ECCP database offers a valuable first impression of active clusters in the region, it does not reflect the full diversity of the cluster landscape in the state, as not all organisations are registered with a profile on the platform. Therefore, this chapter also draws on additional data sources to present a more comprehensive picture of the number, thematic focus, and structure of clusters in the state. Special attention is given to cluster organisations located in the Heilbronn-Franken economic region, highlighting their role in advancing regional industrial transformation. Furthermore, the chapter outlines the policy framework supporting cluster development at both the state level and in the Heilbronn-Franken economic region, illustrating how cluster policies contribute to Baden-Württemberg's broader innovation and economic strategies.

ECCP-registered cluster organisations in Baden-Württemberg

Cluster organisations are **key actors in the European economy**, facilitating collaboration, networking, and knowledge sharing between diverse innovation stakeholders within a geographical or sectoral cluster. 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 the state of Baden-Württemberg on the ECCP gives the first impression of the intensity of organisations in regional industrial networks.

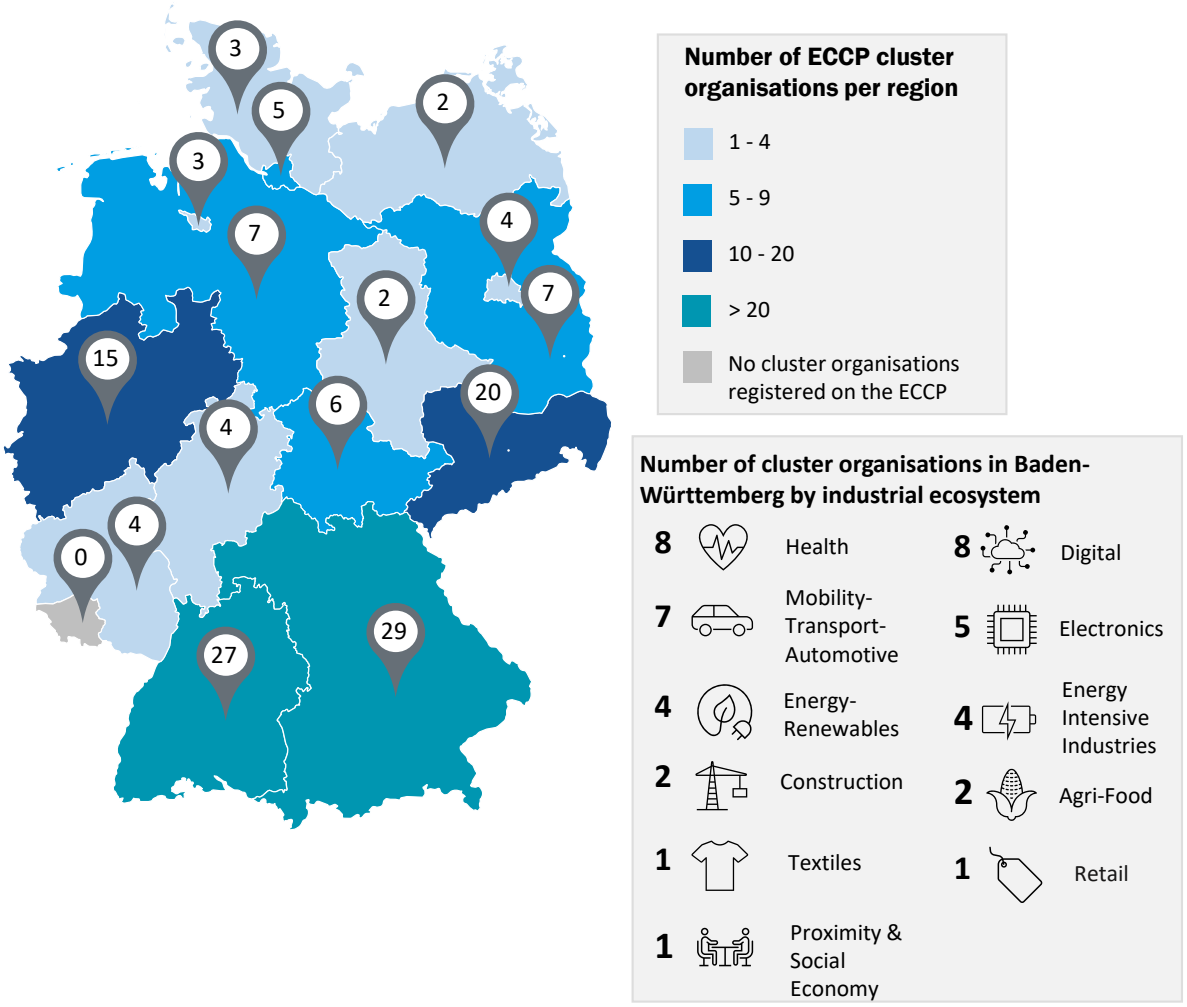
Out of the total 1,235 registered EU27 cluster organisations on the ECCP, there are 138 registered cluster organisations in Germany as a whole and 27 cluster organisations located in the state of Baden-Württemberg. Therefore, the cluster organisations in Baden-Württemberg make up roughly one-fifth of ECCP-registered cluster organisations active in Germany. This makes it the state with the second most cluster organisations on the ECCP after Bavaria and the regions with the fourth most in the EU27 regions after Catalonia, North and East Finland and Bavaria. Looking at the location of these cluster organisations in the region, as shown in Figure 2 the majority are located in the Stuttgart economic region (12, with ten in the city of Stuttgart alone). This is followed by the economic regions of Mittlerer Oberrhein, whose three cluster organisations are all located in Karlsruhe, and the economic region of Rhein-Neckar, with two cluster organisations located in the city of Mannheim and another in Heidelberg. The economic region of Heilbronn-Franken exhibits two registered cluster organisations, located in Heilbronn and Schwäbisch-Hall.

As depicted in Figure 2, the ECCP-registered cluster organisations in the state of Baden-Württemberg are active in 11 out of 14 EU industrial Ecosystems.[25] The most prevalent industrial ecosystems among the ECCP-registered cluster organisations in the state are Digital and Health, each with eight cluster organisations active in these fields. These are followed by Mobility-Transport-Automotive, which is represented by seven cluster

[25] Please note that the ecosystem allocation is based on the selection made by each respective cluster organisation. In cases where no selection was made, the ECCP has assigned the organisation to one or multiple ecosystems based on the available information.

organisations. Electronics stands out as another key ecosystem, with five cluster organisations, while Energy - Renewables and Energy-Intensive Industries each have three organisations operating within them. Furthermore, the Agri-Food and Construction ecosystems are each supported by two cluster organisations. Meanwhile, Retail and Proximity & Social Economy are the least represented, with just one cluster organisation in each ecosystem.

Figure 2: Overview of ECCP-registered cluster organisations in Baden-Württemberg as well as regional distribution of active cluster organisations



Source: ECCP (2025). Own elaboration based on https://reporting.clustercollaboration.eu/all; last access 19.03.2025. A full overview of the 27 ECCP-registered cluster organisations in Baden-Württemberg is provided in Table 1 in the Annex. Note: ECCP-registered cluster organisations can be assigned to multiple ecosystems.

As shown in Figure 3, 38% of cluster organisations registered on the ECCP in Baden-Württemberg employ between one and five staff members, which is significantly below the EU27 average of 65%. By comparison, 54% of the cluster organisations in Baden-Württemberg have a staff size of six to ten employees, which is above the EU27 average (21%). Notably, two clusters are larger, with one cluster organisation having 21-30 employees and another having more than 30 employees. Membership structures in Baden-Württemberg also reveal a notable departure from what is typical in the EU, with 44% of cluster organisations having more than 100 members, much higher than the EU27 average of 30%. This indicates that clusters in Baden-Württemberg tend to operate on a larger scale, engaging more stakeholders. In comparison, around 30% of clusters have up to 50 members (EU27:

45%), and 26% have between 51 and 100 members (EU27: 25%). The relatively larger member base suggests that the cluster organisations in Baden-Württemberg are more integrated into the broader regional economy and act as significant platforms for collaboration and innovation. In terms of their thematic orientation, cluster organisations in Baden-Württemberg are strongly aligned with key EU industrial ecosystems, most notably in the Health, Digital and Mobility-Transport-Automotive ecosystem, where the highest number of cluster organisations are concentrated. Collaboration within these organisations typically focuses on project partnerships, internationalisation efforts, and initiatives related to technology scouting and resource efficiency.

Figure 3: Overview of organisation, structure, and thematic orientation of ECCP-registered cluster organisations in Baden-Württemberg

Organisation

- Thirteen cluster organisations are in the 6-10 employees bracket (54%; ØEU: 21%)
- Nine rather small cluster organisations with 1-5 employees (38%; ØEU: 65%)
- One cluster with 21-30 (4%; ØEU: 3%) and one with more than 30 employees (4%; ØEU: 2%)

Member structure

- Eight organisation are rather small with up to 50 members (30%; ØEU: 45%)
- Seven cluster organisations with 51-100 members (26%; ØEU: 25%).
- Twelve large cluster organisations with more than 100 members (48%; ØEU: 30%).

Thematic orientation

- Cluster organisations in Baden-Württemberg can be related to 11 different EU industrial ecosystems with Health, Digital and Mobility-Transport-Automotive exhibiting the most cluster organisations
- Collaboration often sought in internationalisation, partnering for projects, technology scouting and resource efficiency

Source: ECCP (2025).

It is important to note that while the cluster organisations registered on the ECCP provide a good representation of the cluster landscape, they only include those with validated profiles, leaving out a considerable number of organisations in Baden-Württemberg. For a more comprehensive overview of cluster initiatives in the state, the cluster database of the "RegioClusterAgentur für Innovation und Transformation in Baden-Württemberg" (RegioClusterAgentur BW) serves as a valuable source. The **RegioClusterAgentur BW** is the support agency for cluster initiatives, economic development bodies, and regional innovation systems in Baden-Württemberg. This database contains profiles of **78 cluster initiatives** across the different economic regions of the state of Bade-Württemberg, providing detailed information on the type of cluster, its technological and product focus, regional scope, and other relevant cluster-related data. Cluster initiatives in Baden-Württemberg are structured networks of companies, research institutions, and public entities that enhance innovation and competitiveness in specific sectors. Membership varies, including large enterprises, SMEs, universities, and public institutions. These

initiatives rely on mixed funding, combining public support from the state, federal government, or EU with membership fees and project-based revenues.[26]

In the economic region of Heilbronn-Franken, there are two cluster organisations located, namely Packaging Valley and TransformtiveDIALOG. **TransformotiveDIALOG** is a meta-cluster in the Heilbronn-Franken area, formed in 2022 through the merger of AutomotiveDIALOG, PlasticsDIALOG, and MetalsDIALOG. This consolidation, part of the TRANSFORMOTIVE project funded by the Federal Ministry for Economic Affairs and Climate Action (BMWK), aims to drive innovation and competitiveness in the automotive sector by fostering collaboration among companies, research institutions, and public entities. Its vision is to facilitate the transformation towards sustainable mobility solutions, addressing challenges such as digitalization, electrification, and autonomous driving. By leveraging regional strengths and promoting knowledge exchange, TRANSFORMOTIVE seeks to position Baden-Württemberg as a leader in the future of mobility.[27] The cluster supports companies in the automotive sector, including upstream, downstream, and related industries, offering assistance in strategy development, product development, market cultivation, and workforce qualification. It provides a growing network structure, numerous workshops, and events to facilitate collaboration among companies undergoing transformation.

In 2023, the cluster received the SILVER Label from the European Secretariat for Cluster Analysis (ESCA), valid until the end of 2025. The assessment highlighted TransformotiveDIALOG's well-documented strategy, strong cluster team, and high-quality transformation services. These services include supporting companies in adapting to evolving value chains, helping them collaborate on joint product and service offerings as a coordinated network, and conducting tailored company visits to align support with specific business needs. Currently, TransformotiveDIALOG has 126 members, including seven large companies (one OEM), 105 SMEs, three universities, three research centres, one trade union, an employers' organisation, and a private regional development association. Its strategic focus includes market development, industry networking, lobbying, and personnel development, alongside support for internationalisation. By fostering collaboration between businesses, research institutions, and policymakers, TransformotiveDIALOG strengthens regional competitiveness and innovation, reinforcing Heilbronn-Franken as a key economic location in Germany. The key role that the cluster TransformotiveDIALOG plays in industrial transformation in the economic region of Heilbronn-Franken is highlighted in Box 1, which presents key insights from the ECCP Cluster Solutions Library, highlighting how the cluster supports businesses in navigating digital and green transitions.

Packaging Valley Germany e.V is a key cluster organisation in the packaging industry, representing over 100 companies.[28] These include manufacturers of packaging systems and machinery, as well as providers of software, automation solutions, components, and related services. The cluster focuses on packaging machinery and automation technologies, with applications in various industries such as food, beverages, confectionery, pharmaceuticals, and cosmetics.[29] In 2020, Packaging Valley Germany e.V. and the Packaging Excellence Center

[26] Ministry of Economic Affairs, Labour and Housing Baden-Württemberg (2019): Regionaler Cluster-Atlas Baden-Württemberg. Überblick überclusterbezogene Netzwerke und Initiativen. Available online: https://www.clusterportal-bw.de/fileadmin/media/Download/Downloads_Publikationen/Cluster-Atlas_2019_deutsch.pdf (last access 20.03.2025).
[27] See https://www.flipsnack.com/8B6C7B66AED/erfolgsgeschichte-transformotive/full-view.html (last access 19.03.2025).
[28] For more information, see https://www.packaging-valley.com/de/ (last access 19.03.2025).
[29] See https://www.clusterportal-bw.de/clusterdaten/clusterdatenbank/clusterdb/Clusterinitiative/show/clusterinitiative/packaging-valley-germany-e-v/ (last access 19.03.2025).

(PEC) Region Stuttgart in Waiblingen initiated a merger to consolidate expertise and resources.[30] This step aimed to strengthen their position in the packaging machinery and automation sector and increase international visibility. Following the merger, the organisation continued operating under the name Packaging Valley Germany e.V., maintaining its headquarters in Waiblingen in the Stuttgart economic region with a branch in Schwäbisch Hall, located in the Heilbronn-Franken economic region.[31] Since 2024, the cluster has broadened its scope beyond southwestern Germany, allowing packaging machinery companies from across the country to join the network.[32]

Box 1: ECCP Cluster Solutions Library – TransformotiveDIALOG

TransformotiveDIALOG Cluster – Tackling Industrial Transition in the Regional Automotive Industry

Heilbronn-Franken: A Region at the Heart of Industrial Transformation

The Heilbronn-Franken economic region in Baden-Württemberg is an economic hub with a strong industrial base in automotive, mechanical engineering, and food production. Home to many globally competitive mid-sized firms, or "Hidden Champions," it faces challenges in digitalisation, sustainability, and skilled labor shortages. To stay competitive, businesses must adopt new technologies and sustainable practices.

TransformotiveDIALOG: A Cluster Driving Innovation and Change

To support businesses in navigating industrial transformation, the Economic Development Agency Heilbronn (WFG-Heilbronn) established TransformotiveDIALOG, a meta-cluster combining three sectoral networks in automotive, plastics, and metal industries. It has a clear vision to become “the starting and finishing point for manufacturing companies in the Heilbronn economic region” when it comes to corporate, technological and organisational development. In order to do so, the cluster aims to support regional companies in addressing the challenges of the digital and green transition. This includes adapting to new technological developments, integrating digital technologies into production, and promoting sustainable business models. TransformotiveDIALOG offers a structured service portfolio focused on information, networking, and knowledge building to enhance collaboration and innovation among its members. Key activities include network meetings, joint trade fair participation, an online community, company site visits, and international delegation trips. Additionally, the cluster actively supports members in funding applications and facilitates knowledge exchange through matchmaking services, ensuring long-term competitiveness and regional synergies.

Strengthening Business Resilience and Competitiveness

Despite financial limitations, TransformotiveDIALOG has played a key role in supporting businesses through transition challenges by facilitating funding access and promoting collaborative innovation. Instead of directly financing transformation activities, the cluster focuses on delivering business support services that help companies enhance efficiency, explore new markets, and integrate sustainable technologies. A structured monitoring system allows the cluster to continuously assess its impact and adapt its approach to meet evolving industry needs.

Lessons Learned and Transferability

The success of TransformotiveDIALOG highlights the value of integrating sector-specific clusters into a broader network to create synergies and boost competitiveness. A clear strategic vision and responsive cluster management are essential for effectively guiding companies through transformation. The cluster's approach

[30] See https://packaging-journal.de/geplante-fusion-packaging-valley-germany-und-packaging-excellence-center/ (last access 19.03.2025).
[31] See https://www.stimme.de/wirtschaft/baden-wuerttemberg/packaging-valley-laesst-die-grenzen-fallen-art-4955182 (last access 19.03.2025).
[32] See https://www.clusterportal-bw.de/clusterdaten/clusterdatenbank/clusterdb/Clusterinitiative/show/clusterinitiative/packaging-valley-germany-e-v/ (last access 19.03.2025).

of focusing on practical business support rather than direct funding offers a scalable model for other regions with similar economic structures. Particularly in automotive-focused regions undergoing electrification and digitalisation, this model provides a blueprint for fostering resilience and innovation through collaboration.

Source: ECCP (2025). Note: the full case study on TransformotiveDIALOG can be found in the ECCP Cluster Solutions Library.

Cluster policy in Baden-Württemberg

Baden-Württemberg is not only a textbook example[33] of a vibrant cluster landscape but also has developed a mature cluster policy over the last decades. Building on previous policy efforts, the state government launched its current cluster policy framework[34] in 2007 with a detailed stocktaking of all the region's cluster organisations and networks. The collected data was used for the 2008 "Cluster Atlas", systematically informing about Baden-Württemberg's cluster landscape, with the latest edition being published in 2019. [35] During the early years of the policy, clusters were financed directly and competition-based by the state government to establish a fundamental cluster infrastructure.

Today's institutional setup was launched in 2014 with the establishment of the "ClusterAgentur Baden-Württemberg" (ClusterAgentur BW), a central coordinating agency funded by the state and ERDF funds to assist in managing cluster initiatives and statewide networks in the region. The focus included strategic development, requirements analysis, and the creation of new services for their members.[36] In 2022, finally, the agency found its current incarnation as "RegioClusterAgentur für Innovation und Transformation in Baden-Württemberg (RegioClusterAgentur BW).

RegioClusterAgentur BW supports not only cluster initiatives but also regional development agencies, because both actors are key players for regional transformation. Thus, the RegioClusterAgentur BW has a strong focus on regional transformation as well as business development and supports new models of coordination and cooperation such as transformation partnerships based on identified regional transformation processes. In the field of business development, the RegioClusterAgentur BW offers individual coaching, hands-on support, and strategic dialogues for cluster organisations and networking initiatives, thereby acting as an innovation intermediary.

An important tool of the RegioClusterAgentur BW to support clusters and regional developers is the so-called RIT-Monitor. It analyses the status of Baden-Württemberg's regional transformation performance in the fields of smart production, green & social economy, green & smart mobility, social innovation, and life science. The

[33] Glassmann, U. & Voelzkow, H. (2006): Regionen im Wettbewerb: Die Governance regionaler Wirtschaftscluster. In: Lütz, S. (ed.): Governance in der politischen Ökonomie. Struktur und Wandel im modernen Kapitalismus. Available online: https://www.researchgate.net/publication/237993814_Regionen_im_Wettbewerb_Die_Governance_regionaler_Wirtschaftscluster (last access 20.03.2025).

[34] The policy analysis presented here is adapted from a case study originally conducted for the ECCP Cluster Panorama Report 2024 in condensed form and is largely based on material kindly provided by the RegioClusterAgentur Baden-Württemberg. Available online: https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf (last access 20.03.2025).

[35] Ministry of Economic Affairs, Labour and Housing Baden-Württemberg (2019). Regional Cluster Atlas Baden-Württemberg. Available under: https://www.clusterportal-bw.de/fileadmin/media/Download/Downloads_Publikationen/Cluster-Atlas_2019_englisch.pdf (last access 20.03.2025).

[36] Baden-Württemberg's cluster services can be consulted under: https://www.clusterportal-bw.de/ (last access 20.03.2025).

RIT-Monitor evaluates regional data sources, such as R&I and company data in the context of transformation topics, as well as data on the number of students and its talent potential in transformation fields.[37]

In addition to the RegioClusterAgentur BW, two further programmes play a key role in supporting regional innovation ecosystems in Baden-Württemberg. First, RIS coordinators act as central coordinating actors that work towards a systematic and targeted networking of innovation intermediaries in a region. The development of the regional innovation system Heilbronn-Franken, for example, is supported by an RIS coordinator.[38] Second, technology transfer managers work to strengthen technology transfer between research institutions and companies as well as between companies themselves. Together, these initiatives contribute to a more interconnected regional innovation landscape and help increase the participation of SMEs in collaborative innovation activities.[39]

On a subregional level, Heilbronn's economic policy support[40] for clusters is organised through a set of dialogue formats that gather all important actors in each of the local core industrial value chains. These dialogues – for automotive, plastics, and metals value chains – have been consolidated in the TransformotiveDIALOG (see also Box 1 above) under the auspices of the local development agency Wirtschaftsförderung Raum Heilbronn GmbH (WFG). Its purpose is to facilitate the region's ongoing industrial transformation through cross-clustering, technology transfer, skill development and the strategic acquisition of funding support.[41]

The importance of clusters for regional economic competitiveness

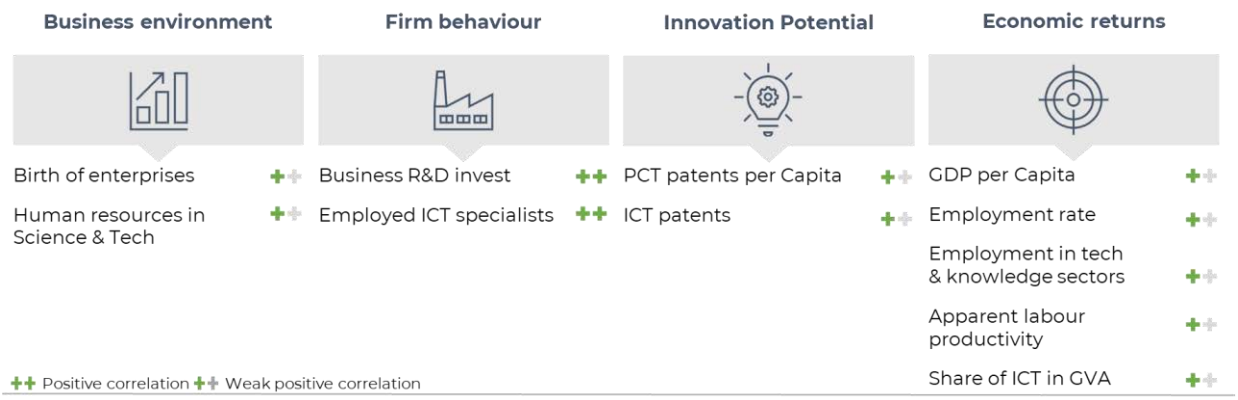
The ECCP European Cluster Panorama Report 2024[42] examines the relationship between clusters and regional competitiveness. The stand-out findings of this analysis are outlined in Figure 4 below and showcase how the presence of clusters is positively correlated with different dimensions of regional economic competitiveness: Business environment, Firm behaviour, Innovation potential and Economic returns. This includes, for instance, the Human resources in Science and Technology in the business environment dimension as well as R&D expenditures of the business sector in the firm behaviour dimension. Positive correlation is also found between the presence of clusters and the level of patenting activities.

On a more global scale, it is found that the presence of clusters is positively correlated with GDP per capita, employment rate, employment in technology and knowledge-intensive sectors, as well as labour productivity.

[37] For more information on the RIT-Monitor, see https://www.clusterportal-bw.de/en/regioclusteragentur/service-portfolio/ (last access 20.03.2025).
[38] See https://wm.baden-wuerttemberg.de/de/service/presse-und-oeffentlichkeitsarbeit/pressemitteilung/pid/regionale-innovationssysteme (last access 20.03.2025).
[39] Landtag von Baden-Württemberg (2025): EFRE-Förderung für Baden-Württemberg. Antrag der Abg. Nikolai Reith und Alena Fink-Trauschel u. a. FDP/DVP und Stellungnahme des Ministeriums für Ernährung, Ländlichen Raum und Verbraucherschutz. Drucksache 17/8248. 31.01.2025. Available online: https://www.landtag-bw.de/resource/blob/557098/d3ffb92f98b3495abbf2059c11db9272/17-8248-pdf-data.pdf (last access 31.03.2025).
[40] This comprises the city of Heilbronn and the county of the same name, both at the NUTS 3 level.
[41] See TransformotiveDIALOG's website and strategy paper. For more on the region's industrial transformation and the role of the dialogues, the WFG and specific transformation projects, see Dufour-Bourru, P.; Grylicki, R.; Kistner, L. (2018): Regionaler Strukturwandel im Wirschaftsraum Heilbronn. In: Koschatzky, K.; Stahlecker, T. (eds.): Innovationsbasierter regionaler Strukturwandel in Deutschland. Chancen, Risiken und politische Perspektiven. ISI-Schriftenreihe Innovationspotenziale. Fraunhofer Verlag. Available online: https://publica.fraunhofer.de/entities/publication/4d443aca-e610-403b-9e5e-0b6d9c0dc0b3 (last access 20.03.2025).
[42] ECCP (2024): European Cluster Panorama Report 2024. Available online: https://www.clustercollaboration.eu/sites/default/files/document-store/Cluster_Panorama2024.pdf (last access 20.03.2025).

Moreover, this examination reveals the relevance of cluster organisations for the Twin Transition, as there is a positive correlation between clusters and the level of 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 linked with higher air pollution.

Figure 4: Relationship of clusters and regional competitiveness, correlation results



Source: ECCP (2024): European Cluster Panorama Report 2024.

In conclusion, the state of Baden-Württemberg shows a well-developed cluster landscape supported by a long-standing cluster policy framework. The EU Cluster Panorama Report (2024) 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.

03

Cross-border cooperation & the involvement of Baden-Württemberg's clusters in European networks & support initiatives

EUROPEAN CLUSTER COLLABORATION PLATFORM

Strengthening the European economy through collaboration

3. Cross-border cooperation and the involvement of Baden-Württemberg's 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.[43] To gain an overview of the existing cross-border cooperation of clusters in Baden-Württemberg, a closer look will be taken in this chapter at their involvement in relevant European support initiatives (see Figure 5).

Figure 5: Overview of selected EU support initiatives that involve clusters from Baden-Württemberg

ESCP-4i

- COSME initiative
- Development and implementation of joint internationalisation strategies to support SME internationalisation
- **Three cluster organisations from Baden-Württemberg are involved in a total of six ESCP-4i projects**

ESCP-4x

- COSME initiative
- Boost the cross-cluster networking and learning within the EU and development of cluster management excellence
- **Five clusters from Baden-Württemberg are involved in five ESCP-4x projects**

Euroclusters

- Single Market Programme
- Support the implementation of the EC industrial strategy through cross-sectoral, interdisciplinary and trans-European cluster initiatives
- **Three cluster organisations from Baden-Württemberg participate in three Euroclusters: AIBC, POLREC, BioMan4R2**

I3

- Funding instrument under the European Regional Development Fund (ERDF) 2021-2027 programming period that provides advisory and financial support
- **One beneficiary (not a cluster organisation) from Baden-Württemberg participates in the I3 project INNO4CFIs**

Source: ECCP (2025).

European Strategic Cluster Partnerships (ESCP)

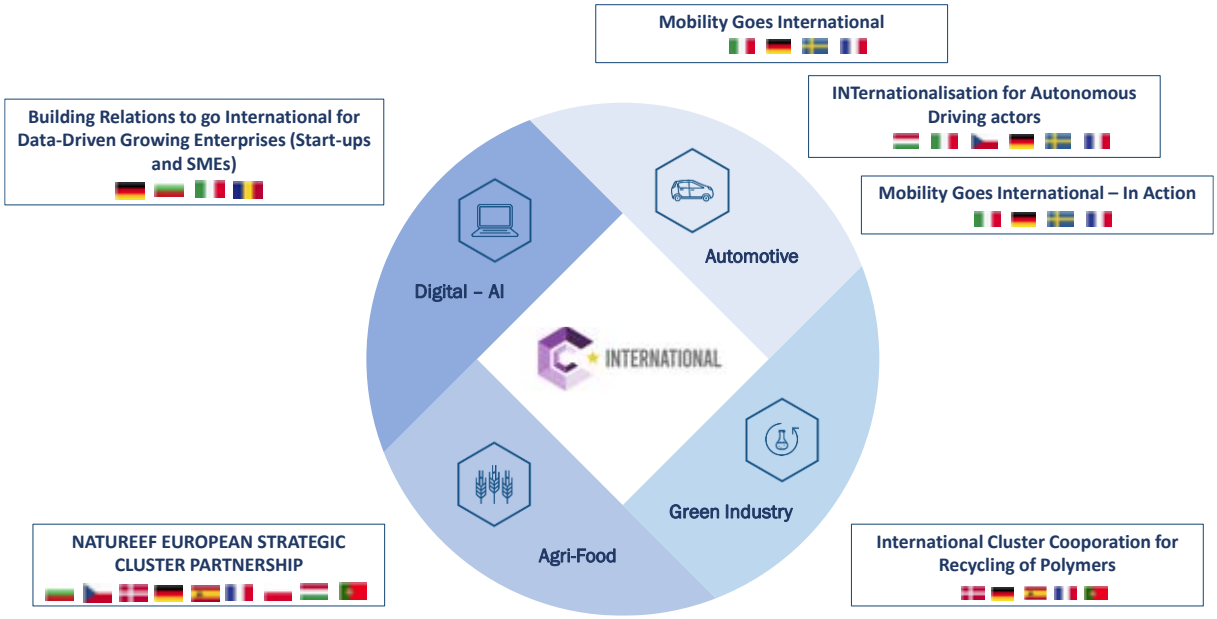
The European Strategic Cluster Partnership (ESCP) initiative, funded under the EU Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) is an EU support initiative to increase cross-border cooperation of EU cluster organisations and other intermediary organisations. 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

[43] Prognos et al. (2021): Evaluation Study of & Potential Follow-Up to Cluster Initiatives under COSME, H2020 & FPI (DG GROW, Unit D2 - Industrial Forum, alliances, clusters). Study on behalf of the European Commission. Available under: https://op.europa.eu/en/publication-detail/-/publication/a2c3e9e1-3deb-11ec-89db-01aa75ed71a1/language-en/format-PDF/source-241039860 (last access on 20.03.2025).

specialisation (ESCP for Smart Specialisation) out of which the ESCP for Going International was still running throughout 2024[44] and the ESCP for Excellence[45] ended in December 2023.[46]

Figure 6 provides an overview of the ESCP-4i projects involving cluster organisations from Baden-Württemberg. In total, six clusters have participated or are currently participating in six separate ESCPs for Going International (ESCP-4i). Furthermore, five cluster organisations are involved in five ESCP for Excellence (ESCP-4x) projects. Overall, the projects, including the five ESCP-4x projects, requested grants for a combined value of €16.924.594. Additionally, the figure below shows that the projects involved cluster organisations from 13 different countries, which are present in the areas of agri-food, digital-AI, automotive and green industry. Moreover, the ESCP-4i projects targeted international markets such as China, India and the USA.

Figure 6: Overview of participation of Baden-Württemberg region's clusters in the ESCP-4i



Source: ECCP (2025). Note: the flags indicate the origin of the involved project partners.

[44] See https://clustercollaboration.eu/eu-cluster-partnerships/escp-4i/fourth-generation (last access 20.03.2025).

[45] See https://clustercollaboration.eu/eu-cluster-partnerships/escp-4x (last access 20.03.2025).

[46] For more information on the European Cluster Partnerships see: https://clustercollaboration.eu/eu-cluster-partnerships (last access 20.03.2025).

Euroclusters

Euroclusters are funded under the Single Market Programme.[47] The Euroclusters initiative aims at supporting cross-sectoral, cross-regional European industry clusters and their cooperation with other economic stakeholders such as companies or business organisations. As displayed in Figure 7, three actors in Baden-Württemberg are part of three Euroclusters:

- The **POLREC** Eurocluster supports a clean and resilient Europe by promoting digitalisation, internationalisation, and resource efficiency while advancing the transition to a circular economy.[48] The project's objective is to strengthen the polymer industry's capacity while simultaneously reducing its environmental impact and enhancing Europe's strategic autonomy in the supply of raw materials for polymer production. This will be achieved by improving recycling processes that convert polymers into other raw materials. Additionally, POLREC aims to support and encourage SMEs to adopt chemical and mechanical recycling processes of plastic waste and use raw materials from recycled polymers to increase the use of these raw materials stemming from recycled polymers. The cluster organisation from Baden-Württemberg associated with this Eurocluster is **TransformotiveDIALOG**, based in Heilbronn. Initiated by the Economic Development Agency Heilbronn, it brings together multiple networks to drive regional transformation and aims to facilitate the development of new value chains while strengthening existing ones through targeted projects and collaborations.

- The **AIBC EUROCLUSTER** focuses on supporting the development of AI and Blockchain solutions by SMEs and start-ups within the European Single Market, particularly those driving digitalisation.[49] Additionally, this Eurocluster facilitates the adoption of AI and Blockchain applications across various industrial ecosystems seeking digital transformation, resilience, and green transition solutions. Furthermore, AIBC aims to foster the internationalisation of AI and Blockchain companies, ensuring that European SMEs in these fields receive support in expanding internationally, enhancing digitalisation, improving resilience, advancing the energy transition, and developing innovative products. As a result, AIBC will develop a long-term strategy to assist SMEs in these areas. The Baden-Württemberg cluster associated with this Eurocluster is **Baden-Württemberg Connected e.V.**, based in Stuttgart. The cluster organisation is the leading business initiative for the promotion of the high-tech sectors in the region. The main goal of the network organisation is to foster key-technologies in order to strengthen the region's economic development.

- **BioMan4R2** is a Eurocluster dedicated to enhancing funding mechanisms in the health sector.[50] Funded under the European Single Market Programme, BioMan4R2 recognises the need to reshape health sector financing by developing new mechanisms to drive innovation. A key focus is supporting SMEs that have the potential to lead in biomanufacturing and medical product development. The primary objective of BioMan4R2 is to launch a support programme for SMEs and to establish, strengthen, and facilitate long-term collaboration among SMEs, investors, research institutions, clinical and knowledge

[47] 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 20.03.2025).

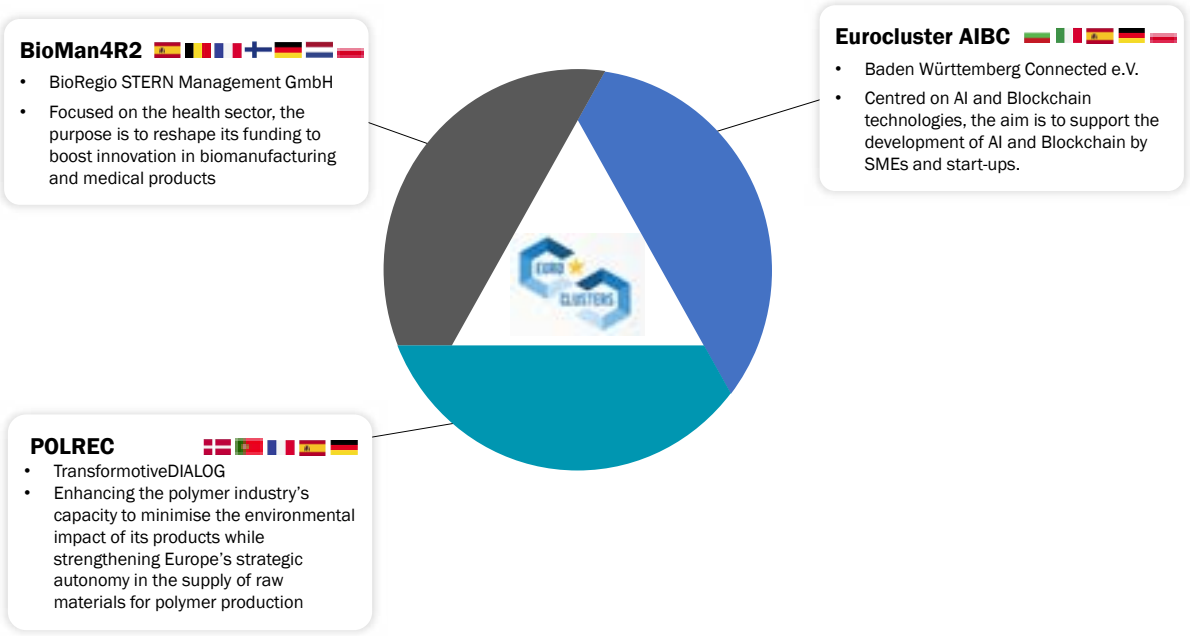
[48] For more information on the Eurocluster POLREC, see https://profile.clustercollaboration.eu/profile/cluster-partnership-initiative/f1bcb89c-745c-48d8-b78e-dbf0c0d262d6 (last access on 31.03.2025).

[49] For more information on the AIBC EUROCLUSTER, see https://profile.clustercollaboration.eu/profile/cluster-partnership-initiative/11e949a6-7d06-4f8f-8834-ad8c659ffa0b (last access on 31.03.2025).

[50] For more information on the Eurocluster BioMan4R2, see https://profile.clustercollaboration.eu/profile/cluster-partnership-initiative/92ad54ce-94c3-486c-b052-36f02b50104f (last access on 31.03.2025).

organisations, science and technology parks, and other key players in the biomanufacturing and MedTech industries at the EU level. The Baden-Württemberg cluster organisation associated with this Eurocluster is **BioRegio STERN Management GmbH** (BioRegio STERN). It serves as a central competence, advisory, and contact point for founders and entrepreneurs in the life sciences sector in the Stuttgart and Neckar-Alb regions.

Figure 7: Overview of participation of Baden-Württemberg region's cluster organisations in the Eurocluster initiative



Source: ECCP (2025). Note: the flags indicate the origin of the involved project partners.

Interregional Innovation Investments (I3)

The Interregional Innovation Investments (I3) partnership is a funding instrument under the European Regional Development Fund (ERDF) 2021-2027 programming period, providing advisory and financial support through the European Innovation Council and SMEs Executive Agency (EISMEA).[51] 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, ultimately supporting them in reaching readiness for further investment. For the 2021-2027 programming period, there are €570 million available (up to €10 million per project) and EU contribution covers 70% for all beneficiaries and cost categories.

Among the 17 I3 projects with beneficiaries from Germany, there are no Baden-Württemberg cluster organisations taking part in these projects. However, there is one organisation in Baden-Württemberg that takes

[51] For more information on I3, see https://eismea.ec.europa.eu/programmes/interregional-innovation-investments-i3-instrument_en (last access 20.03.2025).

part in an I3 project. FAIRVENTURES DIGITAL GMBH, based in Stuttgart, participates in the **INNO4CFIs**[52] project. This project aims to enhance Carbon Farming Initiatives (CFIs) while preserving Biodiversity, Water Security and Soil Health.

INTERREG

Another important programme of interregional cooperation is INTERREG. It is the EU's flagship scheme for cooperation across borders and assists local, regional and national governments in policymaking for regional development issues.[53] INTERREG is about cooperation between communities, regions and countries in the EU and covers the following topics: Smarter Europe, Greener Europe, More connected Europe, More Social Europe, Europe closer to citizens and Better regional governance. Public institutions and private non-profit organisations from all 27 EU member states plus Norway and Switzerland are eligible to participate in the programme, which is co-funded by the European Union and has a budget of €379 million from the European Regional Development Fund (ERDF) for the period from 2021-2027. INTTEREG has multiple subprogrammes, which are divided into three types of programmes: cross-border, transnational and interregional.

The **Interreg Alpine Space Programme 2021–2027** is an Interreg sub-programme that supports cooperation projects among seven Alpine countries. The Programme is aligned with the EUSALP (European Union Strategy for the Alpine Region), and it targets public authorities at local, regional and national levels, business support organisations, higher education institutions, NGOs and associations as the main forces responsible for the structural transition into a more resilient and innovative region. It focuses on fostering sustainable development by supporting projects in areas such as climate adaptation, biodiversity, circular economy, innovation, digitalisation, and multilevel governance across borders.[54] Among the projects funded by the Alpine Space Programme 2021–2027, there are two projects for which the cluster TransformotiveDIALOG is in the lead, cooperating with partners from five countries:

- The **RE-INCITE** (Clusters enable municipalities to collaboratively build circular economy value chains) project fosters a circular economy in the Alpine region by connecting clusters and municipalities to transform industrial waste streams into secondary materials for other industries. [55] By promoting cross-sector and cross-border cooperation, the project contributes to reducing CO_2 emissions and raw material dependency. It establishes a new governance model that links clusters and municipalities, serving as a blueprint for regional authorities to implement macro-regional circular economy strategies. The project is ongoing and is funded under the priority "Cooperatively managed and developed Alpine region" within the 2021–2027 program period, with total eligible costs of €749,956 and an ERDF grant of €562,467. The project is currently ongoing and involves partners from Germany, Slovenia, Italy, and Austria.

- The I**NNOBIOVC** (Innovation Express for Circular Bioeconomy Value Chains) project aimed to strengthen circular bioeconomy value chains in the Alpine region by fostering transnational collaboration among

[52] For more information INNO4CFIs see: https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/projects-details/44416173/101115156/I3?isExactMatch=true&frameworkProgramme=44416173&order=DESC&pageNumber=1&pageSize=50&sortBy=title&countries=20000873 (last access 20.03.2025).
[53] For more information on INTERREG see: https://www.interregeurope.eu/ (last access 31.03.2025).
[54] See https://www.alpine-space.eu/wp-content/uploads/2021/10/20210805_asp_summary_ip-1.pdf (last access 31.03.2025).
[55] See https://www.alpine-space.eu/project/re-incite/ (last access 31.03.2025).

SMEs that typically operate on a local level. [56] Building on previous Interreg projects such as ARDIA-NET and AlpLinkBioEco, the project developed practical tools to connect companies with potential partners, identify funding opportunities, and assess the environmental benefits of circular products. INNOBIOVC contributed to unlocking the potential of bio-based value chains through joint innovation and cross-regional cooperation. It was funded under the priority "Carbon-neutral and resource sensitive Alpine region" within the 2021–2027 funding period, with a total budget of €548,175, including an ERDF contribution of €390,506. The project was implemented from April 2023 to September 2024 and involved partners from Germany, Austria, Slovenia, Italy, and Switzerland.

Vanguard Initiative

Baden-Württemberg was a founding member of the Vanguard Initiative and has been an active contributor since. The objective of the Vanguard Initiative is to stimulate industrial innovation and build European value chains based on complementarities in regional smart specialization strategies:

> "By connecting innovation ecosystems and sharing knowledge and facilities across its member regions, the Vanguard Initiative facilitates interregional collaboration, stimulates interregional innovation investments, strengthens open innovation, and speeds up the introduction and market-uptake of new products and innovations in Europe."[57]

Based on its regional strengths, Baden-Württemberg is co-leading the Initiative's pilot on Artificial Intelligence and participates in the pilots on Efficient and Sustainable Manufacturing (ESM), High-Performance Production Through 3D-Printing, as well as New Nano-Enabled Products.

[56] For more information, see https://www.alpine-space.eu/project/innobiovc/ (last access 31.03.2025).
[57] For more information, see https://www.s3vanguardinitiative.eu/about/who-we-are (last access 31.03.2025).

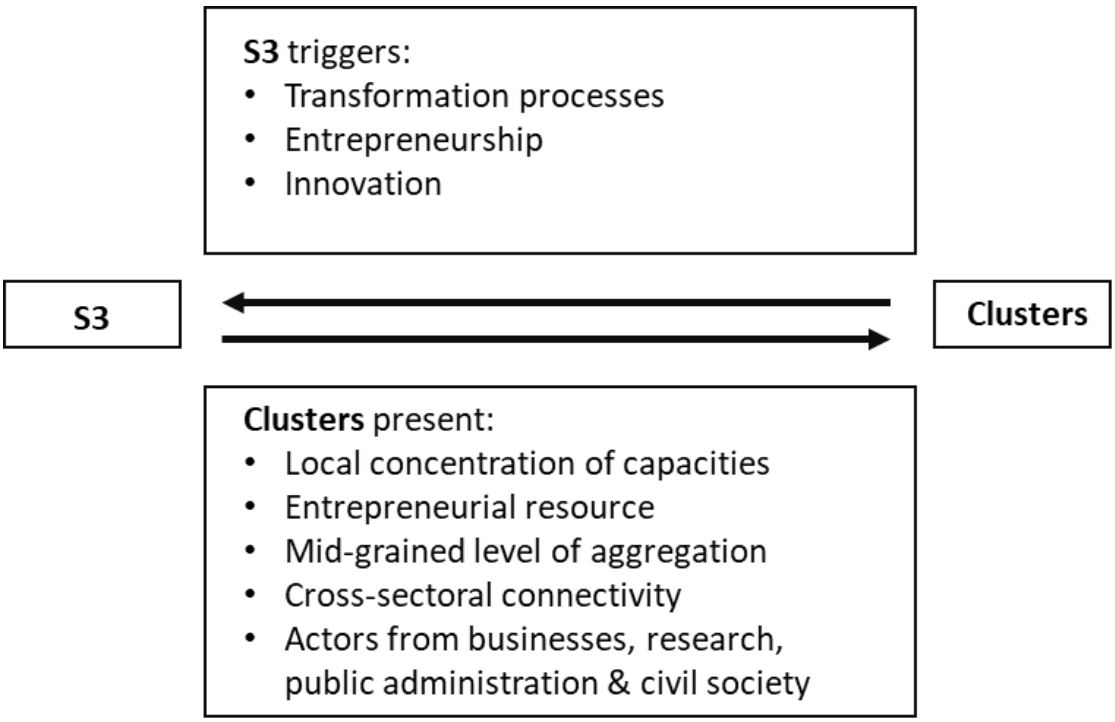
04

Smart Specialisation in Baden-Württemberg

4. Smart Specialisation in Baden-Württemberg

Smart Specialisation is a strategic approach developed by the European Commission that requires regions to identify and leverage their unique strengths and capabilities to foster innovation-driven economic growth. 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. S3 can help to transform the efforts of individual cluster organisations into a regional agenda, while clusters provide a broad range of actors with specific abilities.[58] The interplay between clusters and smart specialisation is also visualised in Figure 8. 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[59] (EDP). Against this background, this chapter focuses on Smart Specialisation in Baden-Württemberg.

Figure 8: Interaction of clusters and S3



Source: ECCP (2024), own adaptations based on Keller et al. (2019): Implementing S3 with Clusters – An Innovation Model for Transformative Activities.

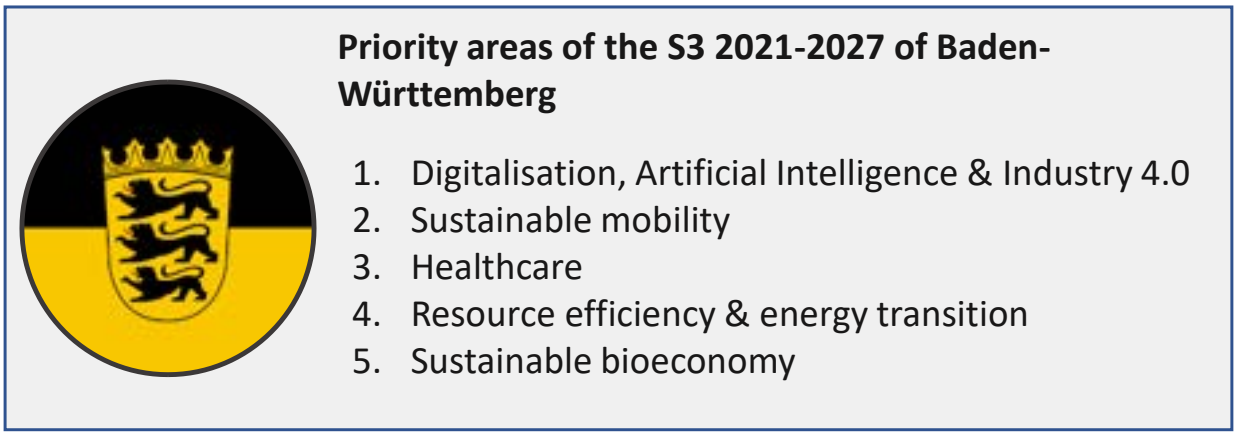
[58] See also European Commission (2013): The role of clusters in smart specialisation strategies. Available under: https://op.europa.eu/en/publication-detail/-/publication/2fe44194-e5a8-42b7-ac14-9c9b8e157de3 (last access 20.03.2025); OECD (2016): OECD Science, Technology and Innovation Outlook 2016 – Cluster Policy and Smart Specialisation. Available under: https://www.oecd-ilibrary.org/docserver/sti_in_outlook-2016-28-en.pdf?expires=1628167848&id=id&accname=guest&checksum=54667669BA762145CD40965A391C05BE (last access 20.03.2025).

[59] 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://ec.europa.eu/regional_policy/policy/communities-and-networks/s3-community-of-practice/entrepreneurial_discovery_en (last access 03.05.2024).

A key starting point for the examination of the S3 2021-2027 of Baden-Württemberg is the Baden-Württemberg innovation strategy.[60] The strategy for 2021-2027 was developed by the Ministry of Economy, Labour and Tourism of Baden-Württemberg in collaboration with other state ministries[61] and published in 2020. Cluster organisations play a central role in the S3 2021-2027 of Baden-Württemberg as the strategy recognises clusters as an integral part of the regional innovation system of Baden-Württemberg. Moreover, the S3 highlights the role of clusters in fostering innovation in companies and in the development of new technologies and business models, as well as the support of clusters for internationalisation activities and the recruitment of skilled workers. In addition, the S3 of Baden-Württemberg calls for a further professionalisation and strengthening of cluster organisations to further support the collaboration between research and business. As such, the S3 of Baden-Württemberg aims at intensifying cross-border, transnational and interregional cooperations of the cluster initiatives and their members.

The S3 2021-2027 of Baden-Württemberg identifies **five priority areas** (see Figure 9). These include the priority areas Digitalisation, Artificial Intelligence & Industry 4.0, Sustainable mobility (encompassing alternative drive systems, new vehicle concepts, and networked, digitalised, autonomous and cross-modal mobility), Healthcare, Resource efficiency & energy transition and Sustainable bioeconomy.

Figure 9: Priority areas of the S3 2021-2027 of Baden-Württemberg



Source: ECCP (2024), own elaboration based on Baden-Württemberg's Innovation Strategy.

In this context, one can outline the participation of Baden-Württemberg in many different partnerships of the **S3 thematic platform "Industrial Modernisation"**. These include the involvement in the partnerships Artificial Intelligence and Human Machine Interface, Advanced Materials for Batteries for Electro-mobility and Stationary Energy Storage, Hydrogen Valleys S3 Partnership, New Nano Enabled Products, Photonics, Space and Wireless ICT. In addition, Baden-Württemberg has launched its flagship programme **Invest BW**, with a total budget of around €500 million (2021–2029), to promote research, development, and innovation within and beyond the defined priority areas. The programme is designed to stimulate innovation and transformation at the firm level, particularly among start-ups and SMEs.[62]

[60] See Ministry of Economic Affairs, Labour and Tourism Baden-Württemberg (2020): Innovationsstrategie Baden-Württemberg – Fortschreibung 2020. Available online: https://wm.baden-wuerttemberg.de/de/service/publikation/did/innovationsstrategie-baden-wuerttemberg (last access 20.03.2025).

[61] These include the Ministry of Science, Research and Arts of Baden-Württemberg, the Ministry of Rural Affairs and Consumer Protection of Baden-Württemberg, the Ministry of the Environment, Climate and Energy Sector of Baden-Württemberg and the Ministry of the Interior, Digitalisation and Migration of Baden-Württemberg.

[62] The Invest BW fund is managed by VDI/VDE Innovation + Technik GmbH on behalf of the Ministry of Economy, Labour and Tourism of Baden-Württemberg. For more information, see https://invest-bw.de/ (last access 28.03.2025).

Another instrument closely aligned with the Smart Specialisation Strategy is the **RegioWIN competition**, which was first introduced in the 2014–2020 ERDF funding period and continued under RegioWIN 2030. It operationalises the S3 approach through a place-based and bottom-up logic that empowers regional actors to develop Regional Development Concepts and identify Lighthouse Projects. These projects are selected through a competitive process and aim to strengthen regional innovation ecosystems in line with the S3 priorities. RegioWIN thus fosters the integration of local strengths into the broader innovation policy of Baden-Württemberg. By targeting future-oriented fields such as AI, sustainable mobility, and the bioeconomy, RegioWIN enhances regional transformation capacities and contributes to the implementation of the state's innovation strategy. For the RegioWIN and RegioWIN 2030 competitions, around €147.9 million in ERDF funds and €56.6 million in complementary state funds have been allocated, leveraging a total investment volume of at least €369.6 million through additional public and private contributions.[63]

In the Heilbronn-Franken economic region, three lighthouse projects were selected as part of the RegioWIN 2030 competition organised by the state of Baden-Württemberg, thereby making a significant contribution to the implementation of the state's Smart Specialisation Strategy (S3). This result highlights the region's above-average success, as most other economic regions received funding for only one or two projects. Notably, Heilbronn-Franken had not secured any project funding in previous rounds of the competition. This suggests that the recently developed Regional Innovation Strategy and the Regional Development Concept have led to a substantial professionalisation of regional innovation governance. The three lighthouse projects from the region are presented below:

- The **AI TRAQC** project which follows the objective of establishing a regional innovation centre for transformation and qualification in the field of artificial intelligence (AI).[64] This centre will operate as a technology and expertise platform and offer targeted and needs-oriented education, training and qualification programmes for regional SMEs. This project is closely aligned with the priority area Artificial Intelligence & Industry 4.0.

- In the context of the priority area Resource efficiency & energy transition, one can highlight the lighthouse project **Hydrogenium**.[65] As a test and application Centre, the "Hydrogenium" aims at providing important support for SMEs and municipal companies in acquiring hydrogen expertise and making a key contribution to the development of the hydrogen economy in Baden-Württemberg. Hydrogen expertise will be made available to interested companies, local authorities, scientific institutions and other organisations as part of consulting and transfer services.

- Furthermore, the **I³ Lab project** has a focus on the priority area of Health. The project supports the construction of research infrastructure, enhancing biological and medical research capabilities and thereby driving economic development in the life sciences sector.[66] The I³, thereby, symbolises the integration of data science, molecular biology research, and clinical studies, fostering interdisciplinary collaboration. The I³ Lab provides state-of-the-art research infrastructure to support a wide range of scientific projects, creating space for new personalised treatment approaches and fostering collaborations at both national and international levels. Close cooperation with clinical partners enables

[63] Landtag von Baden-Württemberg (2025): EFRE-Förderung für Baden-Württemberg. Antrag der Abg. Nikolai Reith und Alena Fink-Trauschel u. a. FDP/DVP und Stellungnahme des Ministeriums für Ernährung, Ländlichen Raum und Verbraucherschutz. Drucksache 17/8248. 31.01.2025. Available online: https://www.landtag-bw.de/resource/blob/557098/d3ffb92f98b3495abbf2059c11db9272/17-8248-pdf-data.pdf (last access 31.03.2025).
[64] See https://2021-27.efre-bw.de/projektbeispiel/ai-traqc/ (last access 20.03.2025).
[65] See https://www.baden-wuerttemberg.de/de/service/presse/pressemitteilung/pid/regiowin-leuchtturmprojekt-hydrogenium-startet (last access 20.03.2025).
[66] See https://i3-lab.eu/en/ (last access 20.03.2025).

the rapid translation of research findings into standard medical care, accelerating innovation in the life sciences sector.

Furthermore, when highlighting projects from the Heilbronn-Franken economic region aligning with the S3, the **Innovation Park Artificial Intelligence (IPAI)** should be included. The IPAI aims to develop the largest artificial intelligence ecosystem in the EU. Its mission is to support companies, SMEs, and organisations on their AI journey, guided by European values. To achieve this goal, IPAI collaborates with leading AI experts from industry and research. At the same time, it provides its members and partners with workspaces and access to cutting-edge AI infrastructure. In addition, IPAI offers a comprehensive platform and essential services for the application and integration of AI, including training programmes, infrastructure services, and access to top-tier partners and a dynamic community of members. Overall, SMEs, large companies, start-ups, AI talents, and public sector actors have the opportunity to develop AI-based software products and solutions within this vibrant ecosystem.[67]

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).

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 sectors. Cluster organisations are represented in this Research and Innovation Council through the board of cluster organisations.

Walloon Region, Belgium – Coordination cells & Strategic Innovation Initiatives:
In the Walloon Region, cluster organisations are actively involved in the Smart Specialisation Strategy (S3) 2021-2027 through their participation in coordination cells for each of the five priority areas. These coordination cells, which include both regional administration and cluster organisations, are responsible for monitoring the development of their respective priority areas. Furthermore, Strategic Innovation Initiatives, which are cross-sector consortia aiming to achieve S3 objectives through a set of coherent projects covering the entire innovation chain, play a key role in the region's innovation framework. Walloon cluster organisations have supported the emergence and structuring of these initiatives and continue to assist in strategy development and ecosystem building to enhance cross-sector collaboration and innovation.

[67] See https://ip.ai/en/ (last access 20.03.2025).

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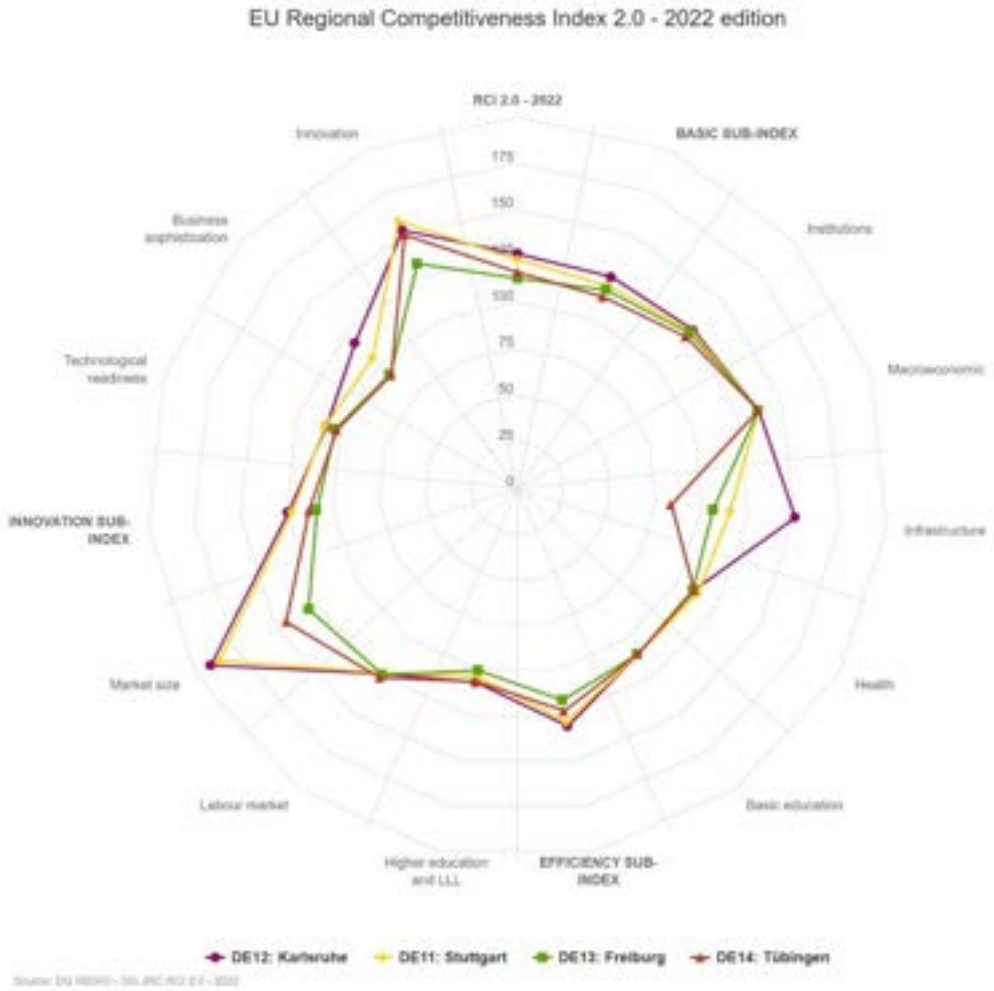
Annex

Regional Competitiveness Level in Baden-Württemberg

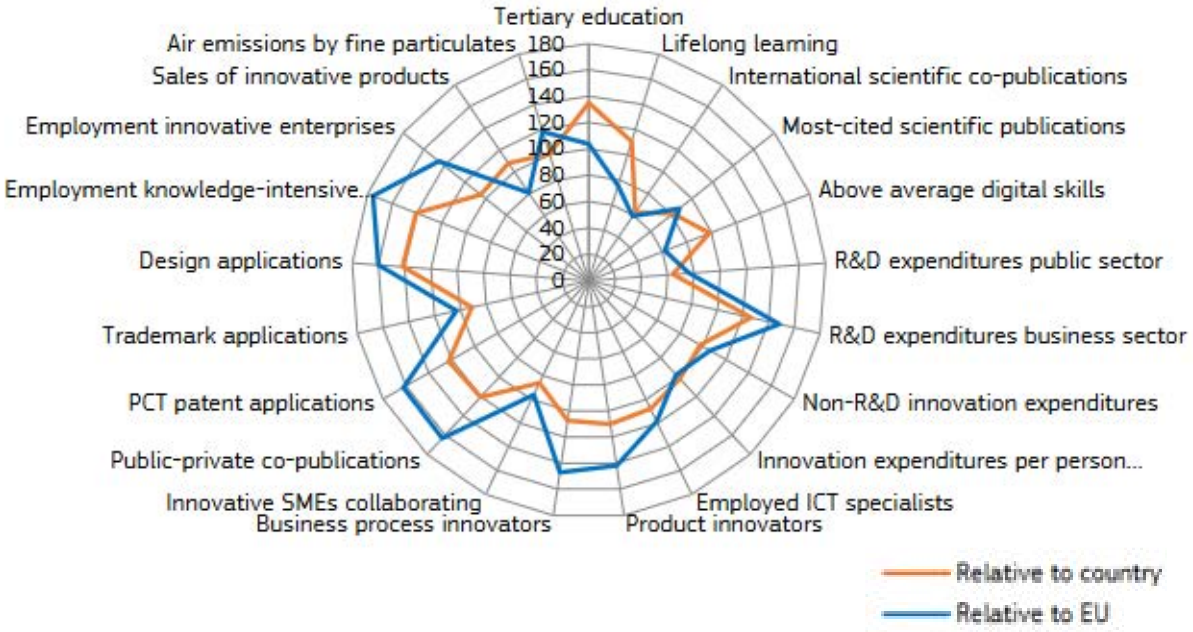
Figure 10: Performance of the four administrative districts of Baden-Württemberg in the 2022 Regional Competitiveness Index



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

Innovation Performance in Baden-Württemberg

Figure 11: Innovation performance of Stuttgart in the 2023 Regional Innovation Scoreboard



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

List of Cluster Organisations in Baden-Württemberg

Table 1: Overview of cluster organisations in Baden-Württemberg and their main addressed EU industrial ecosystems

No.	Cluster organisation	Economic Region	Industrial Ecosystem
1	TRANSFORMOTIVE DIALOG	Heilbronn-Franken	Mobility-Transport-Automotive, Energy-Intensive Industries
2	Packaging Valley Germany e.V.	Heilbronn-Franken / Stuttgart	Agri-food, Digital, Health, Retail
3	cyberLAGO e.V. - digital competence network	Hochrhein-Bodensee	Digital
4	BioLAGO e.V. the health network	Hochrhein-Bodensee	Health
5	CyberForum e.V.	Mittlerer Oberrhein	Digital
6	NanoMat	Mittlerer Oberrhein	Electronics
7	Electrifying Technical Organic Syntheses	Mittlerer Oberrhein	Energy-Intensive Industries, Health, Proximity & Social Economy
8	Innonet Kunststoff, Technologiezentrum Horb GmbH&Co.KG	Nordschwarzwald	Energy-intensive Industries
9	Photonics BW e.V.	Ostwürttemberg	Electronics, Digital
10	Rhine-Neckar Metropolitan Region Ltd.	Rhein-Neckar	Energy - Renewables
11	BioRN - Life Science Cluster Rhine-Neckar	Rhein-Neckar	Health
12	Cluster Smart Industries	Rhein-Neckar	Construction, Digital, Electronics, Mobility-Transport-Automotive, Health
13	MedicalMountains GmbH	Schwarzwald-Baar-Heuberg	Health
14	TechnologyMountains e. V	Schwarzwald-Baar-Heuberg	Construction, Digital, Electronics, Mobility-Transport-Automotive, Health
15	AFBW	Stuttgart	Textiles
16	automotive-bw	Stuttgart	Mobility-Transport-Automotive
17	Baden-Württemberg: Connected e.V.	Stuttgart	Digital
18	biomastec	Stuttgart	Energy - Renewables
19	food.net:z	Stuttgart	Agri-food
20	Leichtbau BW	Stuttgart	Construction
21	ROBONOM - AUTONOMOUS SERVICE ROBOTS	Stuttgart	Digital, Mobility-Transport-Automotive
22	Virtual Dimension Center Fellbach w.V.	Stuttgart	Digital
23	BioRegio STERN Management GmbH	Stuttgart	Health
24	e-mobil BW	Stuttgart	Mobility-Transport-Automotive

25	Cluster Fuel Cell BW Cluster	Stuttgart	Energy-Renewables, Mobility-Transport-Automotive, Energy-Intensive Industries
26	Innovations- und Effizienzcluster innoEFF	Südlicher Oberrhein	Energy - Renewables
27	microTEC Südwest e.V.	Südlicher Oberrhein	Electronics

Source: ECCP (2025) and own adaptations based on the Mapping Tool (last access 19.03.2025) and information and information from the cluster organisation's website.