



European Innovation Scoreboard **2024** Country Profile **Germany**

European Innovation Scoreboard 2024 – Country profile Germany

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**Strong Innovator**

Summary innovation index (relative to EU in 2017): **122.8**
Rank: **12**

Change vs 2023: ▼ -3.4 Change vs 2017: ▲ 3.8

Germany is a Strong Innovator with performance at 111.6% of the EU average in 2024. Performance is above the average of the Strong Innovators (111.3%). Performance is increasing less than the EU (+10%).

Indicator	Performance relative to the EU in 2024	Performance change 2017-2024	Performance change 2023-2024
SUMMARY INNOVATION INDEX	111.6	3.8	-3.4
Human resources	94.0	-5.2	-0.9
New doctorate graduates	139.4	-23.1	-11.6
Population with tertiary education	74.4	8.9	10.1
Population involved in lifelong learning	61.9	6.1	2.0
Attractive research systems	101.1	-1.5	-0.8
International scientific co-publications	92.1	20.9	-3.7
Scientific publications among the top 10% most cited	107.1	-10.5	-0.7
Foreign doctorate students as a % of all doctorate students	100.6	-1.9	1.9
Digitalisation	86.4	26.9	5.6
Broadband penetration	100.0	49.9	6.9
Individuals with above basic overall digital skills	67.7	4.2	4.2
Finance and support	95.0	17.6	1.9
R&D expenditure in the public sector	136.1	0.0	0.0
Venture capital expenditures	100.7	50.1	2.0
Direct and indirect government support of business R&D	40.1	5.8	5.0
Firm investments	141.1	4.7	-7.0
R&D expenditure in the business sector	143.7	7.5	1.5
Non-R&D innovation expenditures	135.0	4.5	-6.1
Innovation expenditures per person employed	144.1	1.8	-17.3
Use of information technologies	115.3	-7.8	9.1
Enterprises providing ICT training	128.2	-16.0	22.3
Employed ICT specialists	102.9	0.0	-3.2
Innovators	119.0	13.4	-29.4
SMEs introducing product innovations	104.3	-21.0	-41.4
SMEs introducing business process innovations	130.8	45.8	-18.2
Linkages	131.8	20.3	-11.3
Innovative SMEs collaborating with others	94.0	38.5	-22.0
Public-private co-publications	185.3	30.1	-13.9
Job-to-job mobility of HRST	141.6	0.0	0.0
Intellectual assets	120.2	-19.2	-7.7
PCT patent applications	130.3	-9.8	-1.5
Trademark applications	106.4	5.2	-5.7
Design applications	119.3	-50.8	-17.3
Employment impacts	126.8	9.1	0.6
Employment in knowledge-intensive activities	104.5	10.8	6.0
Employment in innovative enterprises	145.9	7.4	-4.5
Sales impacts	101.3	0.3	-3.8
Exports of medium and high technology products	108.0	-2.9	2.8
Knowledge-intensive services exports	90.2	-0.3	-9.7
Sales of new-to-market and new-to-firm innovations	108.1	5.8	-6.4
Environmental sustainability	114.6	7.9	0.0
Resource productivity	127.7	46.1	6.3
Air emissions by fine particulates	116.0	1.3	0.5
Environment-related technologies	100.2	-13.7	-6.0

Relative strengths

- Public-private co-publications
- Employment in innovative enterprises
- Innovation expenditures per person employed

Relative weaknesses

- Direct and indirect government support of business R&D
- Population involved in lifelong learning
- Individuals with above basic overall digital skills

Strong increases since 2017

- Venture capital expenditures
- Broadband penetration
- Resource productivity

Strong decreases since 2017

- Design applications
- New doctorate graduates
- SMEs introducing product innovations

Strong increases since 2023

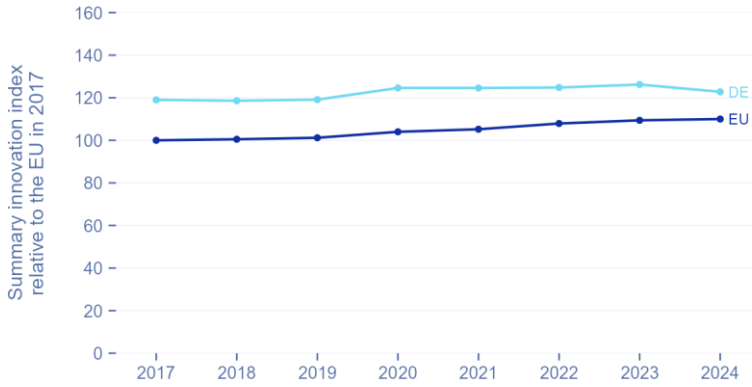
- Enterprises providing ICT training
- Population with tertiary education
- Broadband penetration

Strong decreases since 2023

- SMEs introducing product innovations
- Innovative SMEs collaborating with others
- SMEs introducing business process innovations

Footnote: The first data column shows scores relative to the EU in 2024, with colour codes indicating performance levels. The subsequent columns show performance changes over time, with scores relative to the EU in 2017, coloured in purple for positive change and red for negative change. As reference years differ between the first column (2024) and the last two columns (2017), scores cannot be directly compared or subtracted across these columns.

Emerging Innovators Moderate Innovators Strong Innovators Innovation Leaders



Summary innovation index

The line chart shows the evolution of the innovation performance of Germany over time, relative to the performance of the EU in 2017.

Footnote: All performance scores (SII and dimensions below) are relative to that of the EU in 2017.

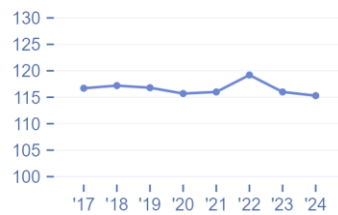
Framework conditions

Germany’s framework conditions show both progress and challenges since 2017. While the number of new doctorate graduates has decreased (-23.1%-points), it is still 139.4% of the EU average in 2024. Nonetheless, the population with tertiary education (+8.9%-points) and participation in lifelong learning has increased (+6.1%-points) since 2017. Digitalisation has significantly improved (+26.9%-points), particularly in broadband penetration (+49.9%-points) and is now at the EU average in 2024, helped by government initiatives like the Digital Strategy 2025, which aims to enhance digital infrastructure and skills. Germany has mixed results regarding attractive research systems, the citation impact of its publications has declined since 2017 (-10.5%-points), international scientific co-publications has increased of 20.9%-points since 2017, although all the three indicators are similar to the EU average in 2024 (±10%-points).

Human resources



Attractive research systems



Digitalisation



Investments

Financing R&D in Germany has shown mixed trends since 2017. However, they still score very high in comparison to the EU average with large scale initiatives such as the High-Tech Strategy 2025 which aims to boost R&D investment. While public sector R&D expenditure remains strong (136.1% of EU average 2024) and venture capital investments have significantly risen (+50.1%-points), direct and indirect government support for business R&D is among the lowest in EU (40.1% of the EU average). Firm investments in innovation have increased and remained high (141.1% of EU average in 2024), R&D expenditure in the business sector, non-R&D innovation expenditures, and innovation expenditure per person employed are well above the EU average in 2024 at 143.7%, 135.0%, and 144.1% of it, respectively. Enterprises providing ICT training however has fallen of 16.0%-points, and employed ICT specialists remains constant since 2017, close to the EU average.

Finance and support



Firm investments



Use of information technologies



Innovation activities

Since 2017, Germany's innovation landscape has evolved with mixed results. However, in comparison to the EU average for 2024 only one indicator falls below it, innovative SMEs collaborating with others at 94.0%. While the number of innovators has grown (+13.4%-points), SMEs are facing challenges in sustaining product innovations (-21.0%-points), although there has been an improvement in business process innovations (+45.8%-points). Linkages in the innovation ecosystem has grown by 20.1%-points since 2017, with public-private co-publications performing the best at 185.3% of the EU average in 2024. Job-to-job mobility also performs impressively with 141.6% of the EU average in 2024. These linkages are supported by policies like the Go-Inno and Go-Digital Programmes. However, maintaining consistency in intellectual assets such as patent and design applications appears as challenging in Germany, with drops of respectively 9.8%-points and 50.8%-points between 2017 and 2024. Despite this, the overall production of intellectual assets remains at 120.2% of the EU average in 2024.

Innovators



Linkages



Intellectual assets



Impacts

Germany's economic landscape has seen notable shifts from 2017 to 2024. Employment in knowledge-intensive activities has grown (+10.8%-points), reflecting a focus on high-value sectors and skilled labour. Although, employment in innovative enterprises performs more impressively being 145.9% of the EU average in 2024. Sales impacts have varied, with exports of medium and high technology products showing a slight decrease to being 108.0% of the EU average in 2024, which contrasts Germany's strong position in sectors such as automotive engineering, machinery, and pharmaceuticals. However, it should be noted that as of late, the automotive industry is beginning to lag because of failure to keep up with electrification, as noted by Spiegel International. Knowledge-intensive services exports have declined marginally to 90.2% of the EU average in 2024.

Environmental sustainability efforts have seen positive strides, particularly in resource productivity (+46.1%-points) which is 127.7% of the EU average, signalling more efficient resource use while air emissions have shown minor improvements. However, there has been a decrease in patents based on environmentally related technologies (-13.7%-points) now approximately scoring the EU average. Programmes such as Germany's key innovation projects, and those under the Green Hydrogen initiative, the Umwelt innovations programme (Environmental Innovation Programme), and the National Climate Protection Initiative (NKI), are substantial efforts by various ministries in environmental-related technologies. While these programmes foster advancements in clean technologies and large-scale industrial projects, many have not yet reached their full maturity and thus are not fully reflected in terms of patents or the establishment of new firms.

Employment impacts



Sales impacts



Environmental sustainability



Structural differences

Performance and structure of the economy

Germany maintains a strong economy rooted in its prominent industrial and technological sectors. The country's high GDP per capita (117.3% of the EU average) is helped by its manufacturing industry, particularly in automotive, machinery, and pharmaceutical industries, which are key for its global exports in high and medium high-tech products. The employment structure also reflects this, with significant participation in high-tech sectors from manufacturing (50.5%) and a notable presence in knowledge-intensive services (28.3%). Unsurprisingly, with companies such as Bosch, Bayer and, Siemens, large enterprises dominate the economic landscape with companies contributing substantially to turnover (61.2%) and value added, while SMEs face challenges in scaling up despite their importance in employment.

Business and entrepreneurship

Germany has a robust environment for business and entrepreneurship. KfW plays a significant role in supporting entrepreneurship and industry in Germany, which stands at 7.9 and higher than the EU average (6.8). As the country's public bank, KfW provides credits to industries and offers co-funding programs for citizens, such as those for purchasing heat pumps or insulating buildings. Additionally, Germany's Mittelstand, consisting of small and medium-sized enterprises, includes many global innovation leaders. Key organisations such as the BDI (Federation of German Industries) also play a vital role, offering strong industry and employee associations with local offices and support structures. Additionally, Germany's strategic focus on innovative technologies across key industries like automotive engineering (e.g., Volkswagen's electric vehicles), machinery (e.g., Siemens' automation technologies), and pharmaceuticals (e.g., BioNTech's COVID-19 vaccine) fosters a favourable environment for top R&D spending enterprises (14.1% of enterprises) and foreign direct investment (2.8% of GDP), both strongly above the EU average.

Innovation profiles

Germany's innovation profile reflects a strong focus on internal business process innovation, with a higher proportion of in-house business process innovators (23.8%) compared to the EU average (17.6%), facilitated by schemes such as Central Innovation Programme for SMEs (ZIM). However, Germany has fewer in-house product innovators with market novelties (8.5%). A notable proportion of German firms are in-house product innovators without market novelties (20.7%), highlighting their focus on internal improvements rather than market differentiation. The country also has a higher percentage of innovators that do not develop innovations themselves (10%). Germany is well known for its technology transfer with a good range of public institutes set up to help industry, such as Fraunhofer.

Governance and policy framework

Germany is a federal parliamentary republic with a high Corruption Perceptions Index score (79) which reflects its robust anti-corruption measures. Basic-school entrepreneurial education (2.7) is above the EU average (2.6) helped by programmes such as Unternehmergeist in die Schulen (Bringing Entrepreneurial Spirit to Schools). Government activity in the innovation market is high also with innovation procurement as a share of total public procurement (9.4%), and government procurement of advanced technology products (4.6) higher than the EU average.

Climate change

Germany's approach to climate change is characterised by significant efforts in eco-innovation and sustainable practices, often exceeding EU averages. The high Eco-Innovation Index score (141.2) underscores Germany's leadership in developing and implementing innovative solutions to environmental challenges driven by initiatives such as the National Climate Initiative (NKI) and the Climate Action Programme 2030 which support a wide range of environmental projects. However, Germany's greenhouse gas emissions intensity of energy consumption (86.8) is slightly higher than the EU average (82.8).

Demography

Germany's demographic profile shows it as one of the most populous and densely populated countries in the European Union. With a population of over 83 million people, Germany is the most populated country in the EU and one of the largest by land mass. The country's average annual population growth rate of 0.7% is more than double the EU average, reflecting both natural growth and net migration.

Structural indicators

The table below presents some structural differences between Germany and the EU.

	DE	EU
Performance and structure of the economy		
GDP per capita	117.3	100
Average annual GDP growth (2021-2023 average)	0.8	1.9
Employment share Manufacturing	19.1	15.8
Employment share High and Medium high-tech	50.5	37.9
Employment share Services	38	39.8
Employment share Knowledge-intensive services	28.3	28.6
Turnover share SMEs	9.7	12.6
Turnover share large enterprises	61.2	49.6
Foreign-controlled enterprises – share of value added	12.2	13.3
Business and entrepreneurship		
Enterprise births	0.7	0.8
Total Entrepreneurial Activity	7.9	6.8
FDI net inflows	2.8	1.9
Top R&D spending enterprises	14.1	8.4
Buyer sophistication	4.3	3.6
Innovation profiles		
In-house product innovators with market novelties	8.5	11.7
In-house product innovators without market novelties	20.7	13.7
In-house business process innovators	23.8	17.6
Innovators that do not develop innovations themselves	10	6.1
Innovation active non-innovators	5.6	4.2
Non-innovators with potential to innovate	18.5	17.8
Non-innovators without disposition to innovate	12.9	30.6
Governance and policy frameworks		
Corruption Perceptions Index	79	64
Basic-school entrepreneurial education and training	2.7	2.6
Government procurement of advanced technology products	4.6	3.4
Rule of law	1.5	1
Innovation procurement as a share of total public procurement	9.4	9.2
Climate change		
Circular material use rate	12.9	11.5
Greenhouse gas emissions intensity of energy consumption	86.8	82.8
Eco-Innovation Index	141.2	121.5
Demography		

	DE	EU
Population size (in millions)	83.6	447
Average annual population growth (2021-2023 average)	0.7	0.3
Population density	235.9	109

References

The country's relative strengths and weaknesses for each indicator, compared to other EU Member States and neighbouring countries, can be found in [Annex B](#).

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This report provides the Country profile from the 2024 European Innovation Scoreboard for Germany

Studies and reports

