



GERMANY

8th

Germany ranks 8th among the 132 economies featured in the GII 2022.

The Global Innovation Index (GII) ranks world economies according to their innovation capabilities. Consisting of roughly 80 indicators, grouped into innovation inputs and outputs, the GII aims to capture the multi-dimensional facets of innovation.

The following table shows the rankings of Germany over the past three years, noting that data availability and changes to the GII model framework influence year-on-year comparisons of the GII rankings. The statistical confidence interval for the ranking of Germany in the GII 2022 is between ranks 5 and 9.

Rankings for Germany (2020–2022)

GIIYR	GII	Innovation inputs	Innovation outputs
2020	9	14	7
2021	10	14	8
2022	8	12	7

- Germany performs better in innovation outputs than innovation inputs in 2022.
- This year Germany ranks 12th in innovation inputs, higher than both 2021 and 2020.
- As for innovation outputs, Germany ranks 7th. This position is higher than last year but the same as 2020.

8th

Germany ranks 8th among the 48 high-income group economies.

5th

Germany ranks 5th among the 39 economies in Europe.

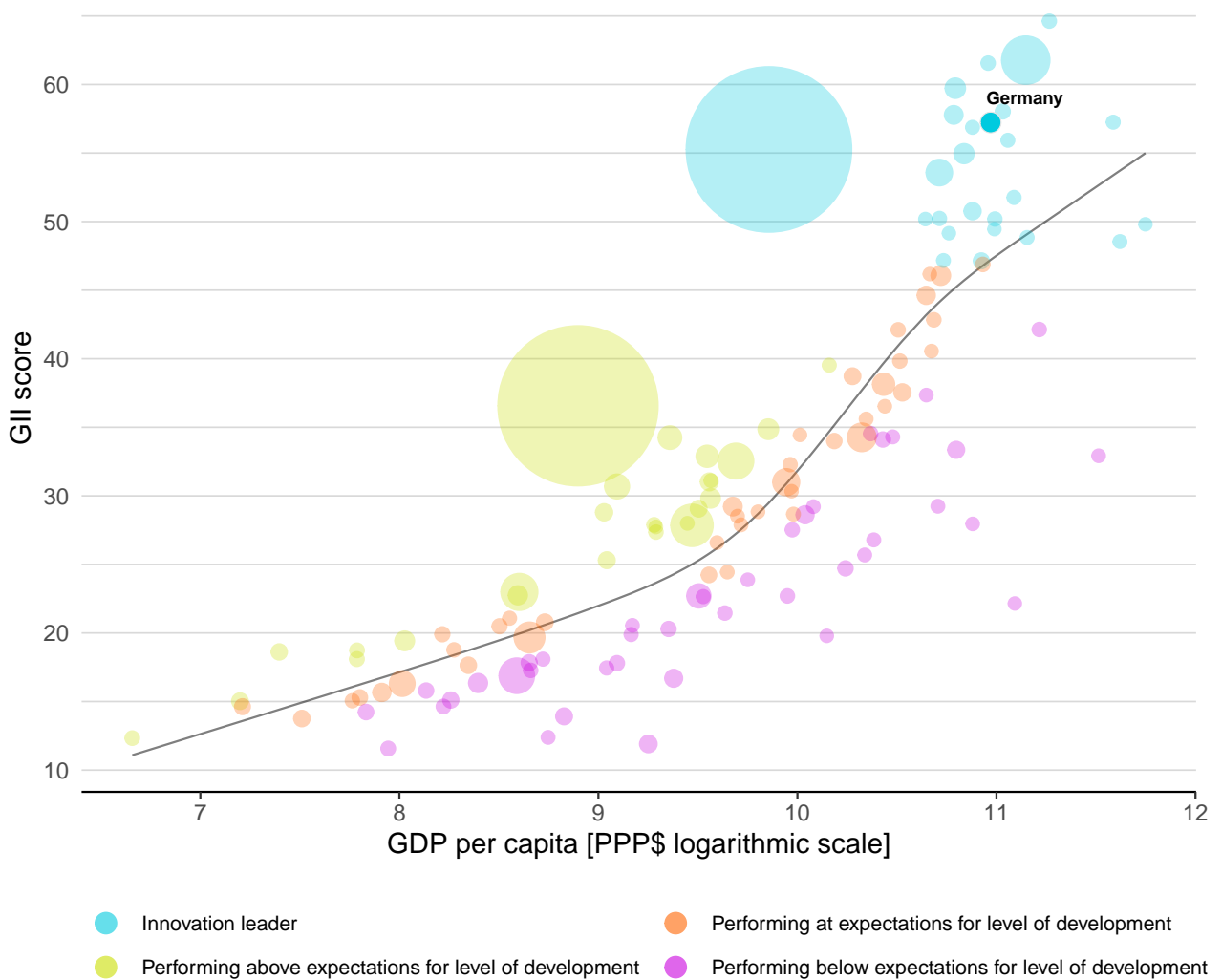


EXPECTED VS. OBSERVED INNOVATION PERFORMANCE

The bubble chart below shows the relationship between income levels (GDP per capita) and innovation performance (GII score). The trend line gives an indication of the expected innovation performance according to income level. Economies appearing above the trend line are performing better than expected and those below are performing below expectations.

Relative to GDP, Germany's performance is above expectations for its level of development.

The positive relationship between innovation and development



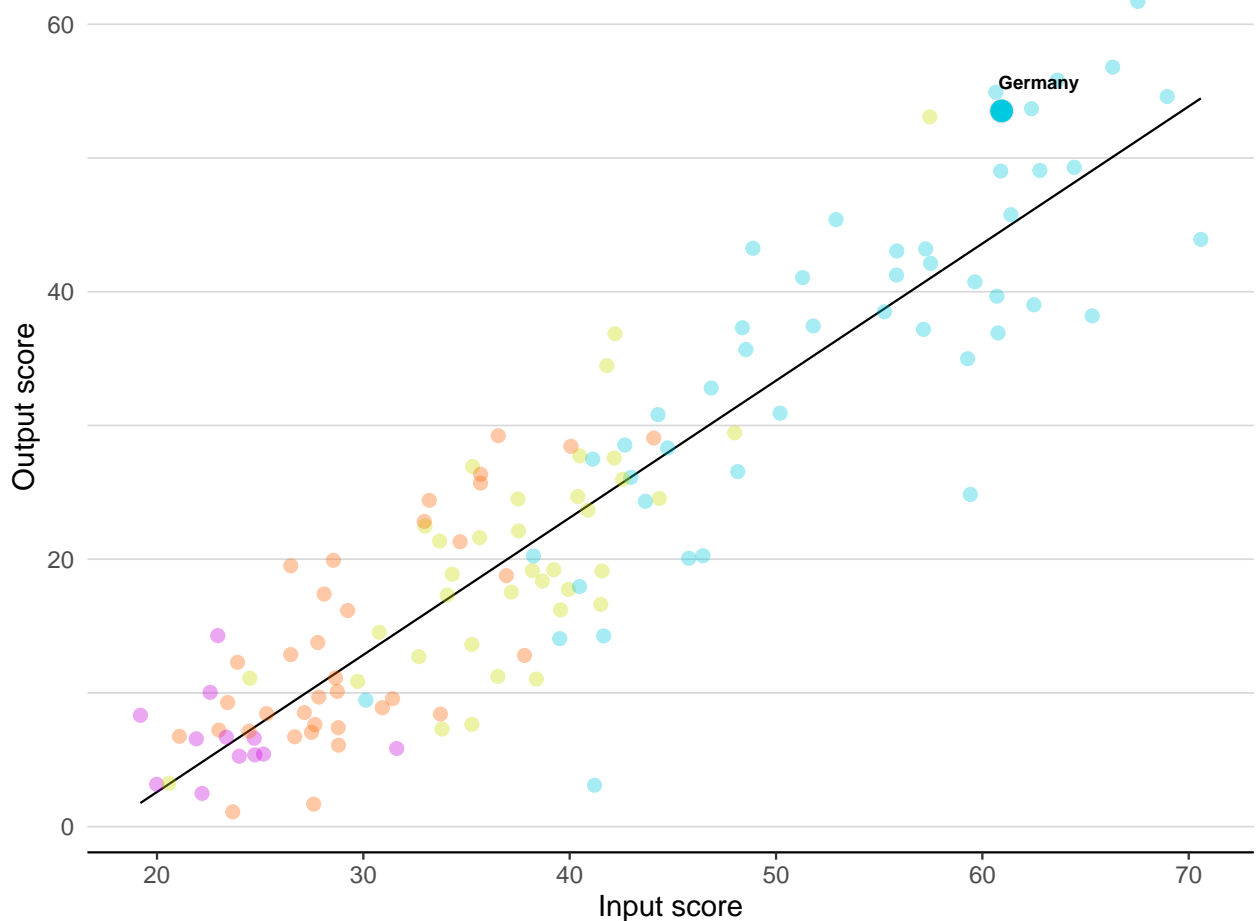


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

The chart below shows the relationship between innovation inputs and innovation outputs. Economies above the line are effectively translating costly innovation investments into more and higher-quality outputs.

Germany produces more innovation outputs relative to its level of innovation investments.

Innovation input to output performance

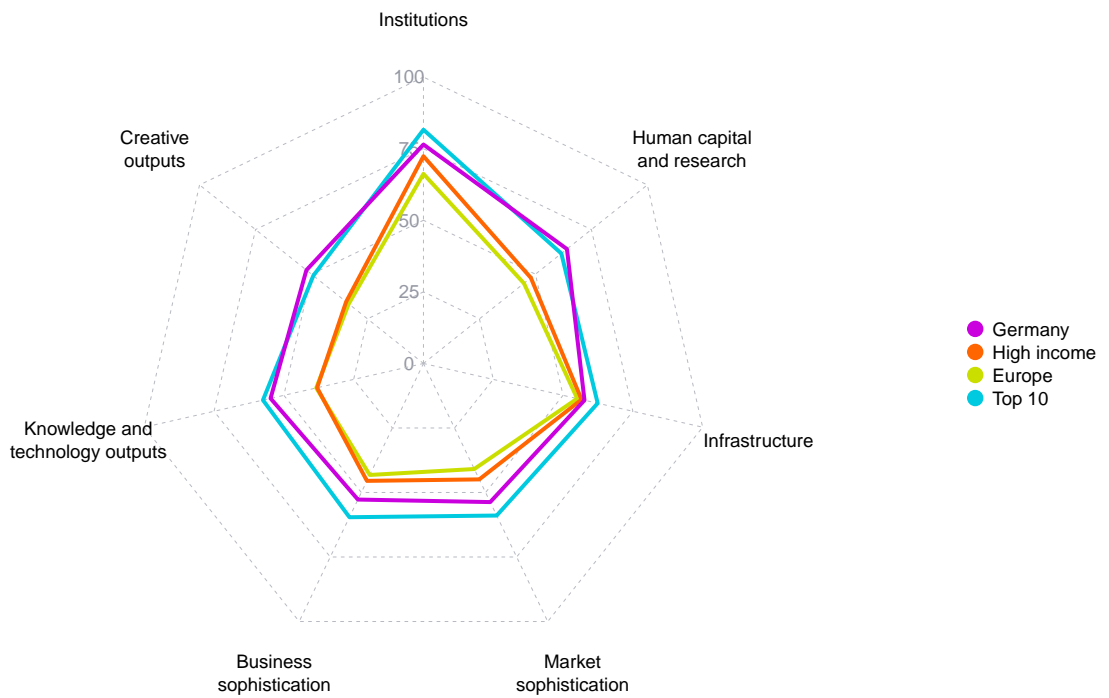


Income ● High income ● Upper middle ● Lower middle ● Low income — Fitted line



BENCHMARKING AGAINST OTHER HIGH-INCOME GROUP ECONOMIES AND EUROPE

The seven GII pillar scores for Germany



High-income group economies

Germany performs above the high-income group average in all GII pillars.

Europe

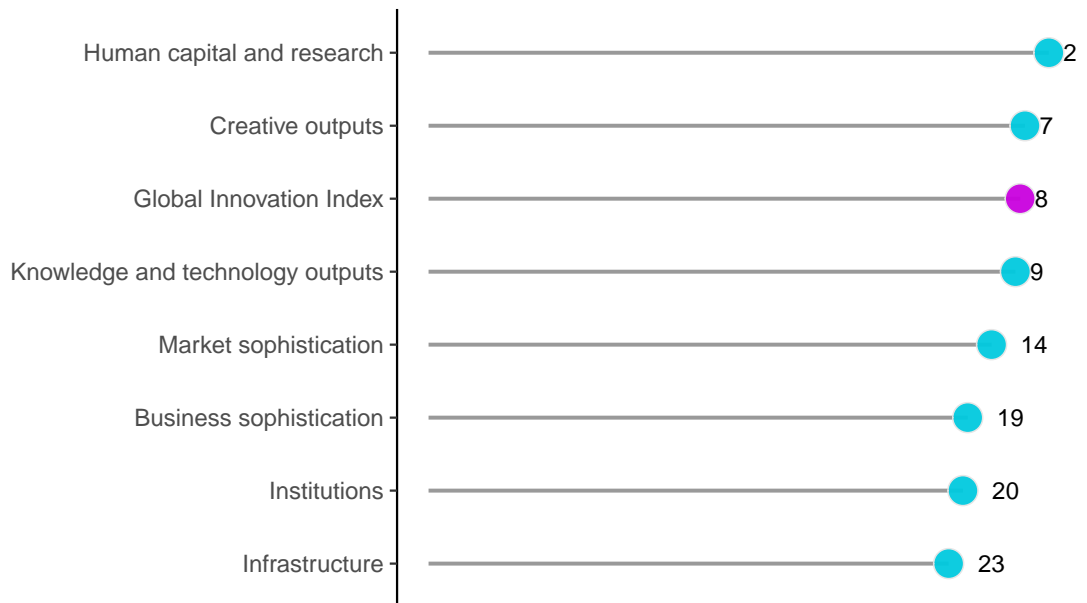
Germany performs above the regional average in all GII pillars.



OVERVIEW OF RANKINGS IN THE SEVEN GII 2022 AREAS

Germany performs best in Human capital and research and its weakest performance is in Infrastructure.

The seven GII pillar ranks for Germany



Note: The highest possible ranking in each pillar is 1.

The full WIPO Intellectual Property Statistics profile for Germany can be found at:

https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=DE.

INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of the indicator strengths and weaknesses of Germany in the GII 2022.








Strengths and weaknesses for Germany

Strengths			Weaknesses		
Code	Indicator name	Rank	Code	Indicator name	Rank
2.3.3	Global corporate R&D investors, top 3, mn USD	2	1.2.3	Cost of redundancy dismissal	92
3.2.2	Logistics performance	1	3.1.3	Government's online service	59
4.3.3	Domestic market scale, bn PPP\$	1	3.1.4	E-participation	57
5.2.2	State of cluster development and depth	7	3.2.3	Gross capital formation, % GDP	76
5.2.5	Patent families/bn PPP\$ GDP	6	4.2.1	Market capitalization, % GDP	36
6.1.1	Patents by origin/bn PPP\$ GDP	1	5.1.5	Females employed w/advanced degrees, %	51
6.1.5	Citable documents H-index	3	6.2.1	Labor productivity growth, %	88
6.3.2	Production and export complexity	3	6.2.2	New businesses/th pop. 15–64	73
7.1.4	Industrial designs by origin/bn PPP\$ GDP	7	6.3.4	ICT services exports, % total trade	59
7.3.2	Country-code TLDs/th pop. 15–69	6	7.2.4	Printing and other media, % manufacturing	53

Germany

8

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP\$ (bn)	GDP per capita, PPP\$
7	12	High	EUR	83.9	4,843.4	58,150

	Score/Value	Rank		Score/Value	Rank
 Institutions	76.5	20	 Business sophistication	52.7	19
1.1 Political environment	80.4	20	5.1 Knowledge workers	60.7	21
1.1.1 Political and operational stability*	81.8	24	5.1.1 Knowledge-intensive employment, %	45.7	21
1.1.2 Government effectiveness*	79.0	20	5.1.2 Firms offering formal training, %	n/a	n/a
1.2 Regulatory environment	79.3	30	5.1.3 GERD performed by business, % GDP	2.1	9
1.2.1 Regulatory quality*	84.4	13	5.1.4 GERD financed by business, %	64.5	8
1.2.2 Rule of law*	86.5	15	5.1.5 Females employed w/advanced degrees, %	14.9	51 ○ ◇
1.2.3 Cost of redundancy dismissal	21.6	92 ○ ◇	5.2 Innovation linkages	52.2	13
1.3 Business environment	69.6	20	5.2.1 University-industry R&D collaboration [†]	64.9	16
1.3.1 Policies for doing business [†]	72.2	14	5.2.2 State of cluster development and depth [†]	68.5	7 ●
1.3.2 Entrepreneurship policies and culture*	67.1	15	5.2.3 GERD financed by abroad, % GDP	0.2	15
			5.2.4 Joint venture/strategic alliance deals/bn PPP\$ GDP	0.1	27 ○ ◇
			5.2.5 Patent families/bn PPP\$ GDP	5.2	6 ●
 Human capital and research	64.1	2 ● ◆	5.3 Knowledge absorption	45.4	25
2.1 Education	62.2	22	5.3.1 Intellectual property payments, % total trade	1.0	41
2.1.1 Expenditure on education, % GDP	5.0	40 ○	5.3.2 High-tech imports, % total trade	10.4	35
2.1.2 Government funding/pupil, secondary, % GDP/cap	23.7	28	5.3.3 ICT services imports, % total trade	2.7	23
2.1.3 School life expectancy, years	17.0	18	5.3.4 FDI net inflows, % GDP	2.9	48
2.1.4 PISA scales in reading, maths and science	500.4	18	5.3.5 Research talent, % in businesses	60.2	12
2.1.5 Pupil-teacher ratio, secondary	11.8	48			
2.2 Tertiary education	54.7	7 ● ◆	 Knowledge and technology outputs	54.8	9
2.2.1 Tertiary enrolment, % gross	73.5	29	6.1 Knowledge creation	68.3	7 ●
2.2.2 Graduates in science and engineering, %	35.8	7 ◆	6.1.1 Patents by origin/bn PPP\$ GDP	15.0	1 ● ◆
2.2.3 Tertiary inbound mobility, %	10.1	25	6.1.2 PCT patents by origin/bn PPP\$ GDP	3.6	10
2.3 Research and development (R&D)	75.3	5 ●	6.1.3 Utility models by origin/bn PPP\$ GDP	2.0	11
2.3.1 Researchers, FTE/mn pop.	5,393.1	14	6.1.4 Scientific and technical articles/bn PPP\$ GDP	27.7	33
2.3.2 Gross expenditure on R&D, % GDP	3.1	9	6.1.5 Citable documents H-index	87.4	3 ● ◆
2.3.3 Global corporate R&D investors, top 3, mn USD	94.0	2 ● ◆	6.2 Knowledge impact	40.2	24
2.3.4 QS university ranking, top 3*	72.2	11	6.2.1 Labor productivity growth, %	0.0	88 ○
			6.2.2 New businesses/th pop. 15-64	1.4	73 ○ ◇
			6.2.3 Software spending, % GDP	0.5	18
			6.2.4 ISO 9001 quality certificates/bn PPP\$ GDP	10.9	27
			6.2.5 High-tech manufacturing, %	56.8	7
 Infrastructure	57.7	23	6.3 Knowledge diffusion	55.9	10
3.1 Information and communication technologies (ICTs)	80.0	48 ○	6.3.1 Intellectual property receipts, % total trade	2.2	11
3.1.1 ICT access*	91.6	32	6.3.2 Production and export complexity	90.1	3 ● ◆
3.1.2 ICT use*	79.7	23	6.3.3 High-tech exports, % total trade	11.7	14
3.1.3 Government's online service*	73.5	59 ○ ◇	6.3.4 ICT services exports, % total trade	2.2	59 ○
3.1.4 E-participation*	75.0	57 ○ ◇			
3.2 General infrastructure	54.5	17	 Creative outputs	52.3	7 ●
3.2.1 Electricity output, GWh/mn pop.	6,919.7	28	7.1 Intangible assets	67.8	7 ●
3.2.2 Logistics performance*	100.0	1 ● ◆	7.1.1 Intangible asset intensity, top 15, %	79.6	10
3.2.3 Gross capital formation, % GDP	22.3	76 ○	7.1.2 Trademarks by origin/bn PPP\$ GDP	70.4	27
3.3 Ecological sustainability	38.6	32	7.1.3 Global brand value, top 5,000, % GDP	148.2	9
3.3.1 GDP/unit of energy use	14.3	28	7.1.4 Industrial designs by origin/bn PPP\$ GDP	12.0	7 ● ◆
3.3.2 Environmental performance*	62.4	13	7.2 Creative goods and services	28.4	34
3.3.3 ISO 14001 environmental certificates/bn PPP\$ GDP	2.2	39	7.2.1 Cultural and creative services exports, % total trade	1.1	30
			7.2.2 National feature films/mn pop. 15-69	4.1	29
			7.2.3 Entertainment and media market/th pop. 15-69	51.7	12
			7.2.4 Printing and other media, % manufacturing	0.9	53 ○
			7.2.5 Creative goods exports, % total trade	2.2	25
 Market sophistication	53.7	14	7.3 Online creativity	45.2	10
4.1 Credit	40.0	31	7.3.1 Generic top-level domains (TLDs)/th pop. 15-69	51.9	13
4.1.1 Finance for startups and scaleups*	48.3	18	7.3.2 Country-code TLDs/th pop. 15-69	84.0	6 ● ◆
4.1.2 Domestic credit to private sector, % GDP	85.7	36	7.3.3 GitHub commit pushes received/mn pop. 15-69	36.8	19
4.1.3 Loans from microfinance institutions, % GDP	n/a	n/a	7.3.4 Mobile app creation/bn PPP\$ GDP	8.0	47
4.2 Investment	25.4	30			
4.2.1 Market capitalization, % GDP	52.5	36 ○			
4.2.2 Venture capital investors, deals/bn PPP\$ GDP	0.2	24			
4.2.3 Venture capital recipients, deals/bn PPP\$ GDP	0.1	22			
4.2.4 Venture capital received, value, % GDP	0.0	23			
4.3 Trade, diversification, and market scale	95.8	2 ● ◆			
4.3.1 Applied tariff rate, weighted avg., %	1.5	20			
4.3.2 Domestic industry diversification	97.0	19			
4.3.3 Domestic market scale, bn PPP\$	4,843.4	1 ● ◆			

NOTES: ● indicates a strength; ○ a weakness; ◆ an income group strength; ◇ an income group weakness; * an index; † a survey question. ○ indicates that the economy's data are older than the base year; see appendices for details, including the year of the data, at https://www.wipo.int/global_innovation_index/en/2022. Square brackets [] indicate that the data minimum coverage (DMC) requirements were not met at the sub-pillar or pillar level.

DATA AVAILABILITY

The following tables list indicators that are either missing or outdated for Germany.

Missing data for Germany

Code	Indicator name	Economy year	Model year	Source
4.1.3	Loans from microfinance institutions, % GDP	n/a	2020	International Monetary Fund, Financial Access Survey (FAS)
5.1.2	Firms offering formal training, %	n/a	2019	World Bank Enterprise Surveys

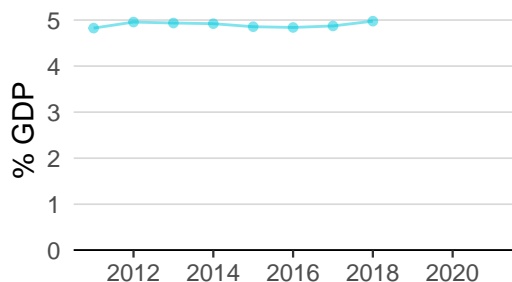
Outdated data for Germany

Code	Indicator name	Economy year	Model year	Source
2.1.1	Expenditure on education, % GDP	2018	2020	UNESCO Institute for Statistics

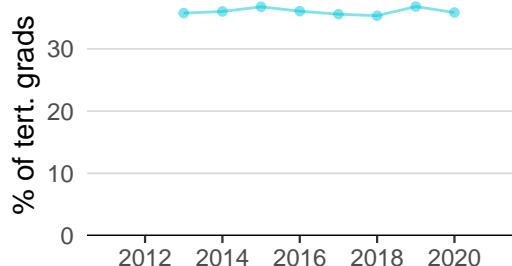
GERMANY'S INNOVATION SYSTEM

As far as practicable, the plots below present unscaled indicator data.

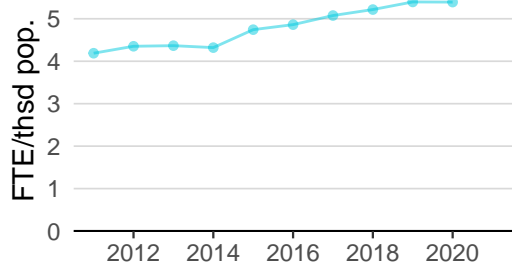
Innovation inputs



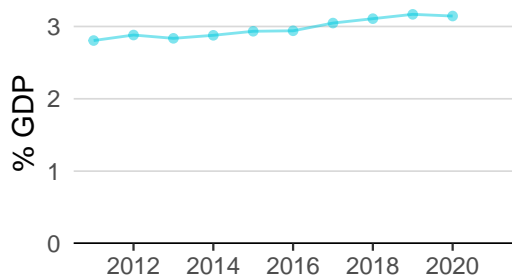
2.1.1 Expenditure on education was equal to 5.0% GDP in 2018—up by 2 percentage points from the year prior—and equivalent to an indicator rank of 40.



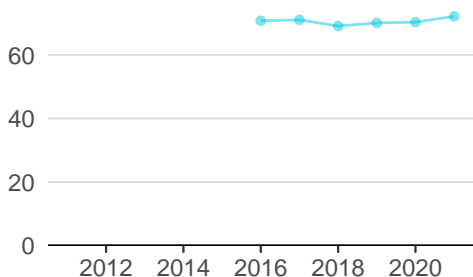
2.2.2 Graduates in science and engineering was equal to 35.8% of tert. grads in 2020—down by 3 percentage points from the year prior—and equivalent to an indicator rank of 7.



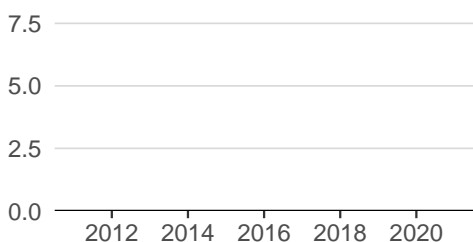
2.3.1 Researchers was equal to 5.4 FTE/thsd pop. in 2020—effectively unchanged from the year prior—and equivalent to an indicator rank of 14.



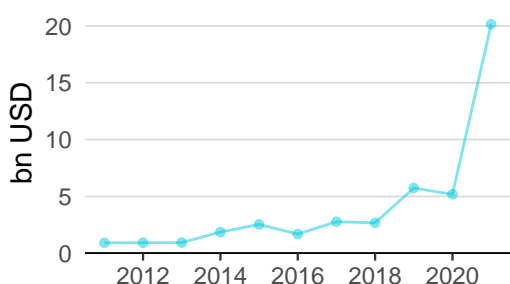
2.3.2 Gross expenditure on R&D was equal to 3.1% GDP in 2020—down by 1 percentage point from the year prior—and equivalent to an indicator rank of 9.



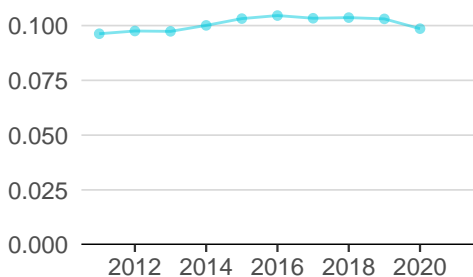
2.3.4 QS university ranking was equal to 72.2 in 2021—up by 3 percentage points from the year prior—and equivalent to an indicator rank of 11.



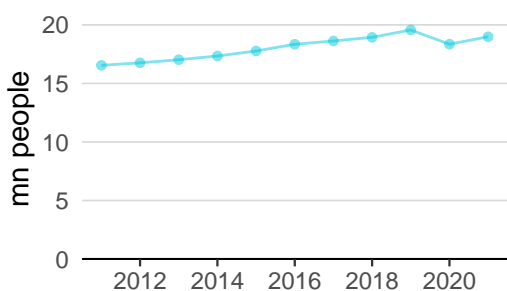
3.1.1 ICT access was equal to 9.2 in 2020 and equivalent to an indicator rank of 32.



4.2.4 Venture capital received was equal to 20.2 bn USD in 2021—up by 289 percentage points from the year prior—and equivalent to an indicator rank of 23.

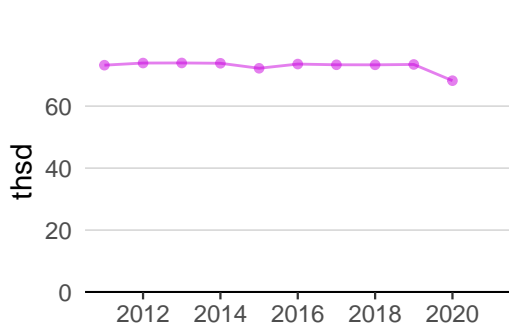


4.3.2 Domestic industry diversification was equal to 0.1 in 2020—down by 4 percentage points from the year prior—and equivalent to an indicator rank of 19.

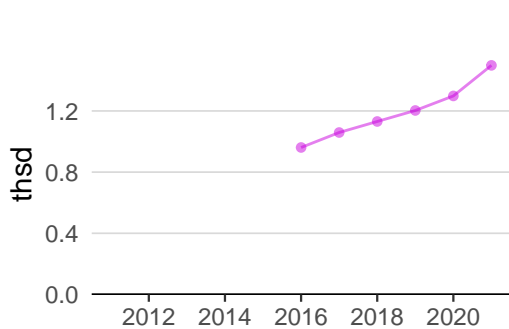


5.1.1 Knowledge-intensive employment was equal to 19.0 mn people in 2021—up by 3 percentage points from the year prior—and equivalent to an indicator rank of 21.

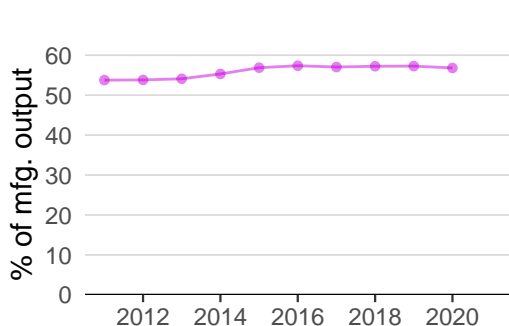
Innovation outputs



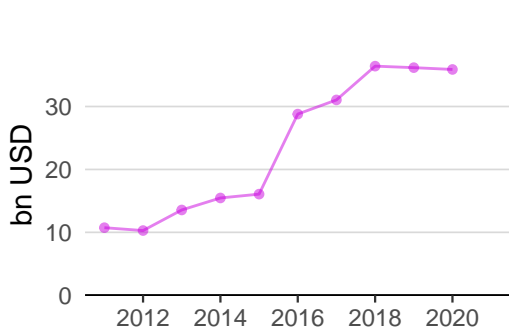
6.1.1 Patents by origin was equal to 68.2 thsd in 2020—down by 7 percentage points from the year prior—and equivalent to an indicator rank of 1.



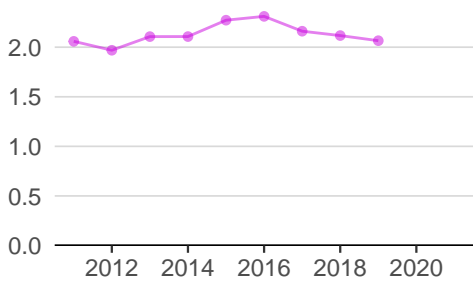
6.1.5 Citable documents H-index was equal to 1.5 thsd in 2021—up by 15 percentage points from the year prior—and equivalent to an indicator rank of 3.



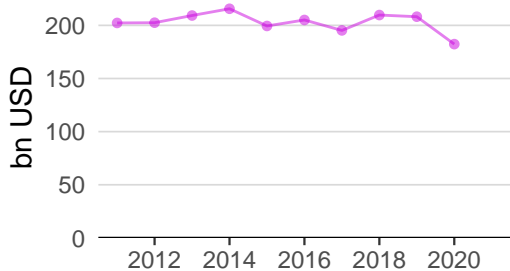
6.2.5 High-tech manufacturing was equal to 56.8% of mfg. output in 2020—down by 1 percentage point from the year prior—and equivalent to an indicator rank of 7.



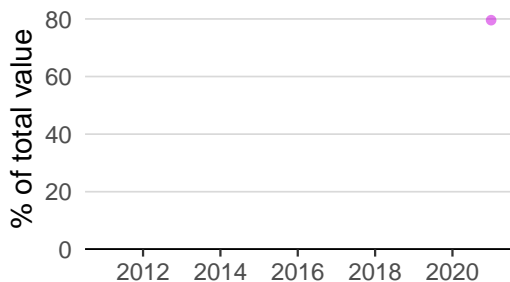
6.3.1 Intellectual property receipts was equal to 35.9 bn USD in 2020—down by 1 percentage point from the year prior—and equivalent to an indicator rank of 11.



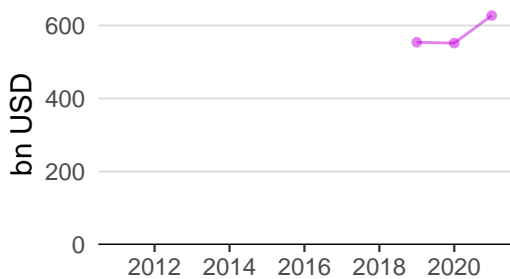
6.3.2 Production and export complexity was equal to 2.1 in 2019—down by 2 percentage points from the year prior—and equivalent to an indicator rank of 3.



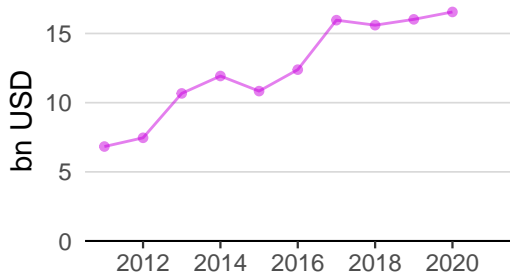
6.3.3 High-tech exports was equal to 182.4 bn USD in 2020—down by 12 percentage points from the year prior—and equivalent to an indicator rank of 14.



7.1.1 Intangible asset intensity was equal to 79.6% of total value in 2021 and equivalent to an indicator rank of 10.



7.1.3 Global brand value was equal to 627.1 bn USD in 2021—up by 14 percentage points from the year prior—and equivalent to an indicator rank of 9.



7.2.1 Cultural and creative services exports was equal to 16.6 bn USD in 2020—up by 3 percentage points from the year prior—and equivalent to an indicator rank of 30.

GERMANY'S INNOVATION TOP PERFORMERS

2.3.3 Global corporate R&D investors

Firm	Industry	R&D	R&D Growth	R&D Intensity	Rank
		[mn EUR]	[%]	[%]	
VOLKSWAGEN	Automobiles & Parts	13,885	-2.9	6.2	7
DAIMLER	Automobiles & Parts	8,441	-12.3	5.5	12
BAYER	Pharmaceuticals & Biotechnology	7,704	36.9	18.1	16

Source: European Commission's Joint Research Centre (<https://iri.jrc.ec.europa.eu/scoreboard/2021-eu-industrial-rd-investment-scoreboard>).
Note: European Commission's Joint Research Centre ranks the top 2,500 firms by R&D investment annually.

2.3.4 QS university ranking

University	Score	Rank
TECHNISCHE UNIVERSITÄT MÜNCHEN	75.6	50
RUPRECHT-KARLS-UNIVERSITÄT HEIDELBERG	70.8	63
LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN	70.1	64

Source: QS Quacquarelli Symonds Ltd (<https://www.topuniversities.com/university-rankings/world-university-rankings/2022>).
Note: QS Quacquarelli Symonds Ltd annually assesses over 1,200 universities across the globe and scores them between [0,100]. Ranks can represent a single value "x", a tie "x=" or a range "x-y".

7.1.1 Intangible asset intensity, top 15

Firm	Rank
DEUTSCHE TELEKOM	1
SAP	2
SIEMENS	3

Source: Brand Finance (<https://brandirectory.com/reports/gift-2021>).
Note: Brand Finance only provides within economy ranks.

7.1.3 Global brand value, top 5,000

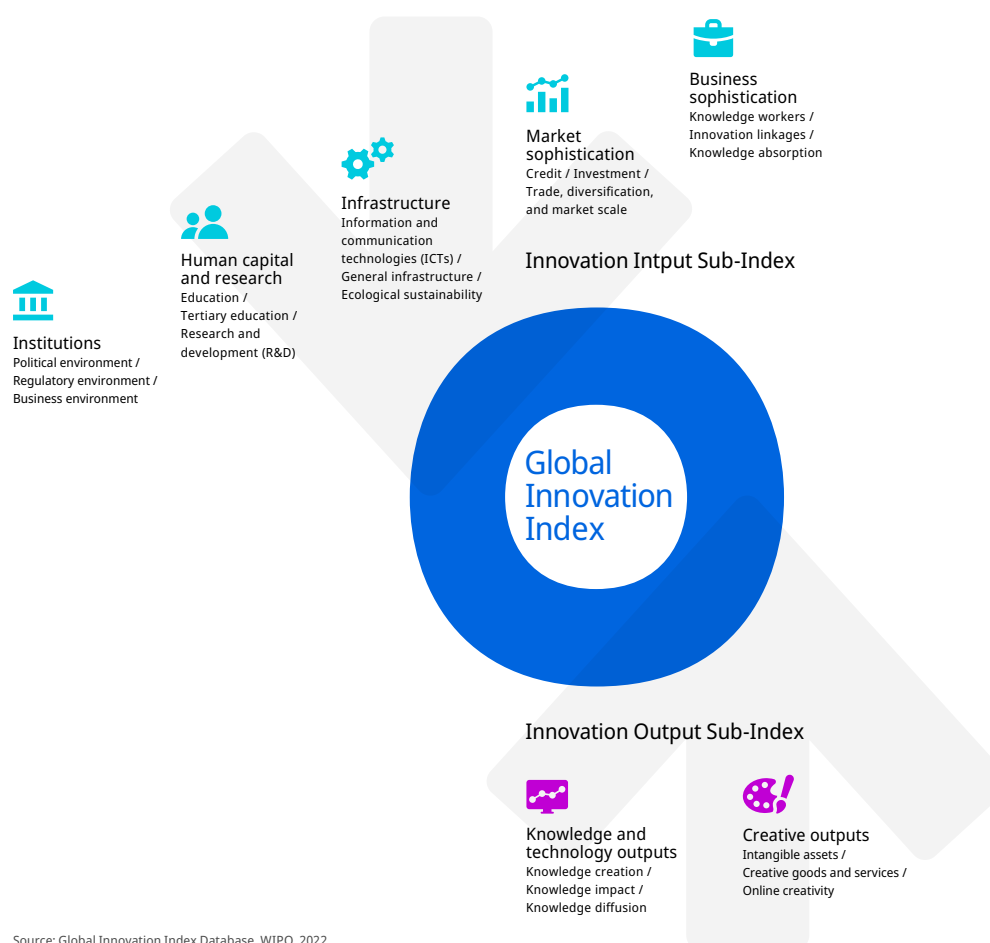
Brand	Industry	Rank
MERCEDES-BENZ	Automobiles	1
DEUTSCHE TELEKOM	Telecoms	2
ALLIANZ GROUP	Insurance	3

Source: Brand Finance (<https://brandirectory.com>).
Note: Rank corresponds to within economy ranks.

ABOUT THE GLOBAL INNOVATION INDEX

The Global Innovation Index (GII) is published by the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations.

Recognizing that innovation is a key driver of economic development, the GII aims to provide an innovation ranking and rich analysis referencing around 130 economies. Over the last decade, the GII has established itself as both a leading reference on innovation and a “tool for action” for economies that incorporate the GII into their innovation agendas.



The Index is a ranking of the innovation capabilities and results of world economies. It measures innovation based on criteria that include institutions, human capital and research, infrastructure, credit, investment, linkages; the creation, absorption and diffusion of knowledge; and creative outputs.

The GII has two sub-indices: the Innovation Input Sub-Index and the Innovation Output Sub-Index, and seven pillars, each consisting of three sub-pillars.