GLOBAL INNOVATION INDEX 2020

GERMANY

9th Germany ranks 9th among the 131 economies featured in the GII 2020.

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 2020 is between ranks 4 and 9.

Rankings of Germany (2018–2020)

	GII	Innovation inputs	Innovation outputs
2020	9	14	7
2019	9	12	9
2018	9	17	5

- Germany performs better in innovation outputs than innovation inputs in 2020.
- This year Germany ranks 14th in innovation inputs, lower than last year and higher compared to 2018.
- As for innovation outputs, Germany ranks 7th. This position is higher than last year and lower compared to 2018.

9th Germany ranks 9th among the 49 high-income group economies.

7th Germany ranks 7th among the 39 economies in Europe.

Germany ranks 9th in the GII this year, retaining the same position since 2018. With a balanced and strong performance across all GII areas, Germany can translate its efforts and investments into high-level innovation outcomes.

Germany presents an outstanding human capital and research system, thanks to its high number of graduates in science and engineering, top R&D-intensive global companies, and a strong university system. The country is also among the highest spenders on R&D, ranking 2nd globally in R&D expenditures.

The country's domestic business sector contributes greatly to these efforts, both performing and financing a high share of R&D expenditures. The level of interactions within the German innovation ecosystem is also noteworthy, with the country ranking 8th in University/industry collaborations and 3rd in Cluster development. Indeed, Germany is home to 10 of the world's top 100 science and technology clusters, with Cologne (19) and Munich (23) in the top 25.

The level and quality of the innovations produced by Germany are also exceptional. The country is the world leader in Patents by origin and ranks in the top 10 in PCT patents, High-technology manufacturing, Industrial designs, ICT & organizational model creation, and Country-code top-level domains. It ranks 11th in the new GII indicator, Global brand value, hosting 149 of the world's top 5,000 brands, two of which fall within the top 25: Mercedes-Benz and Volkswagen. Other top German brands include Deutsche Telekom, BMW, and Porsche.

Germany is the 4th ranking economy in terms of the quality of innovation, thanks to its position within the top 10 in all the indicators that compose this metric. The country shows a particularly solid performance in the Quality of scientific publications, where it ranks 3rd worldwide. It ranks 10th in the Quality of universities, with Technische Universität München, Ludwig-Maximilians-Universität München, and Ruprecht-Karls-Universität Heidelberg among the top higher-education institutions in the world. In the indicator Patent families, which measures the degree of internalization of its inventions, Germany maintains its 9th position.

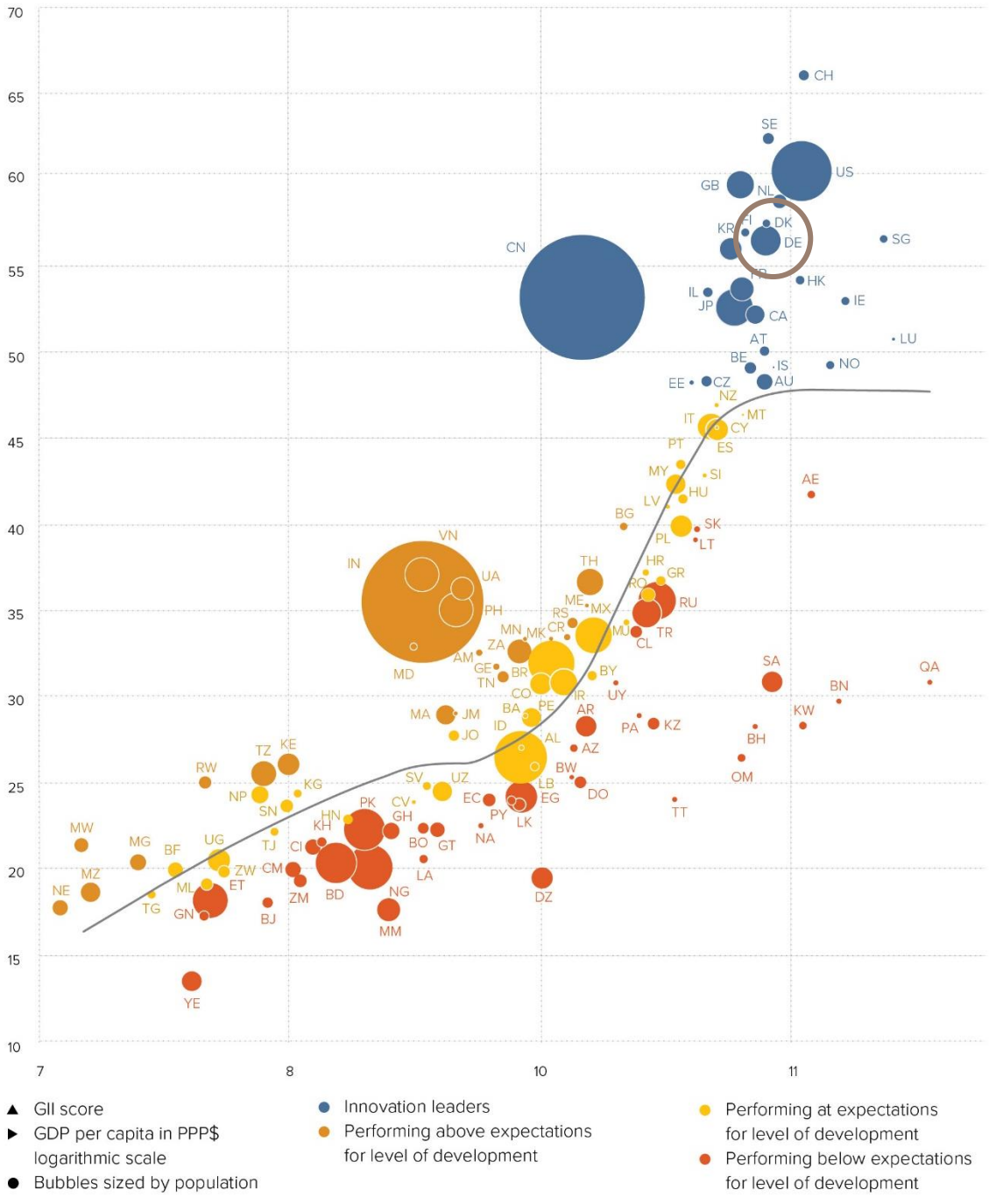
Beyond these areas of excellence, Germany ranks within the top five in indicators such as Ease of resolving insolvency, Logistics performance, and Domestic market scale.

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 is performing above expectations for its level of development.

The positive relationship between innovation and development

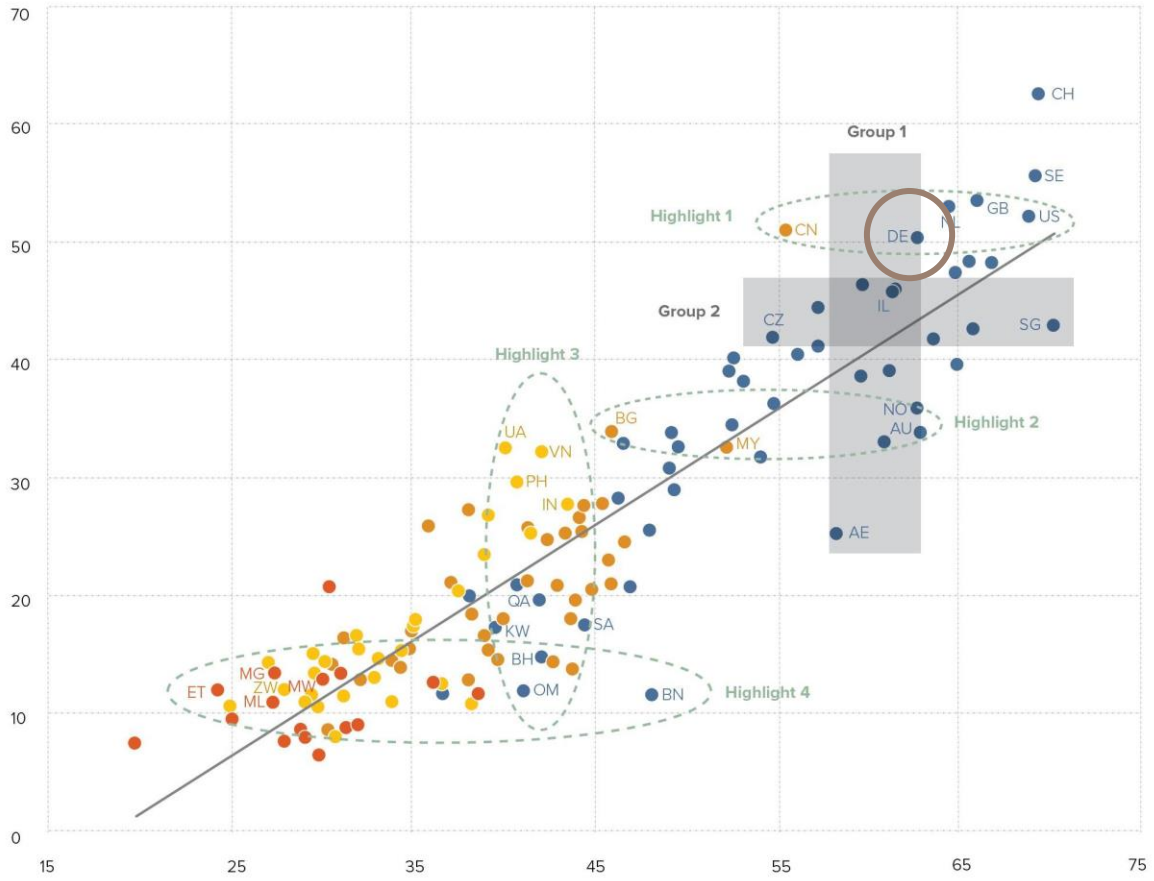


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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, 2020



▲ Output score
► Input score

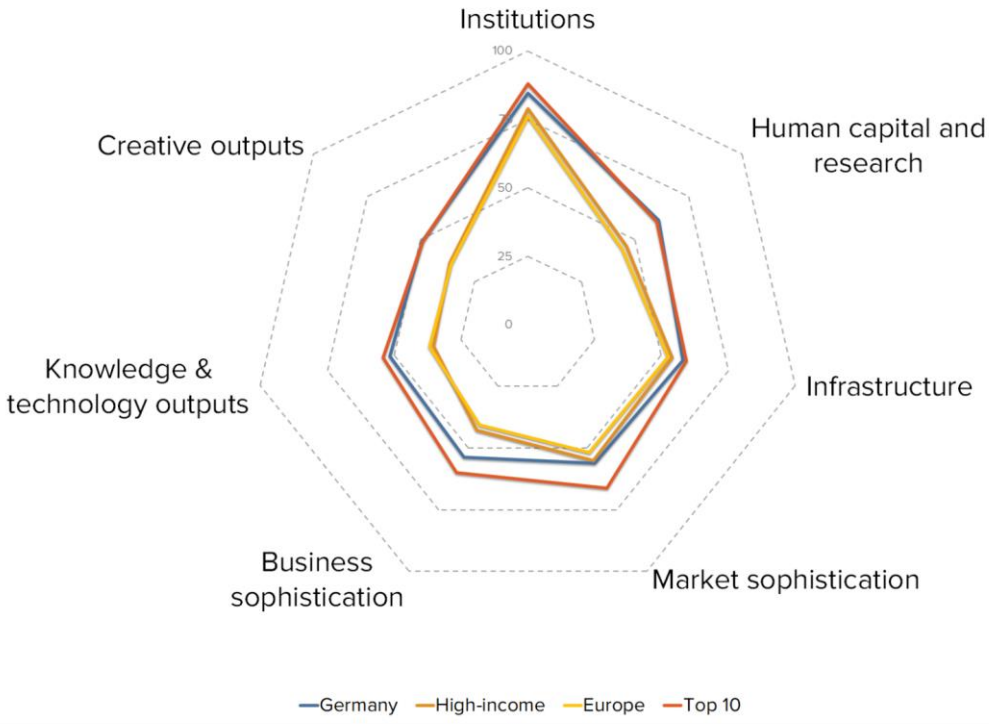
● High income group
● Upper middle-income group
● Lower middle-income group
● Low income group

— Fitted values

AU	Australia	IN	India	NL	Netherlands	CH	Switzerland
BH	Bahrain	IL	Israel	NO	Norway	UA	Ukraine
BN	Brunei Darussalam	KW	Kuwait	OM	Oman	AE	United Arab Emirates
BG	Bulgaria	MG	Madagascar	PH	Philippines	GB	United Kingdom
CN	China	MW	Malawi	QA	Qatar	US	United States of America
CZ	Czech Republic	ML	Mali	SA	Saudi Arabia	VN	Viet Nam
ET	Ethiopia	MY	Malaysia	SG	Singapore	ZW	Zimbabwe
DE	Germany			SE	Sweden		

BENCHMARKING GERMANY AGAINST OTHER HIGH-INCOME GROUP ECONOMIES AND EUROPE

Germany's scores in the seven GII pillars



High-income group economies

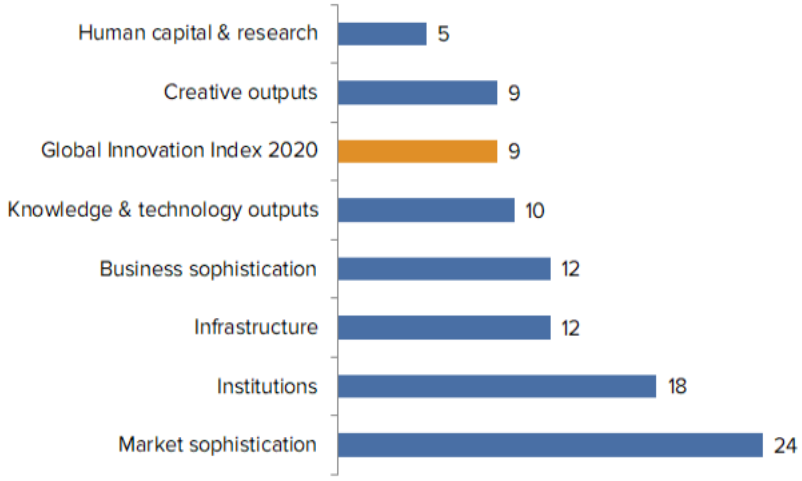
Germany has high scores in all seven GII pillars, which are above average for the high-income group.

Europe

Compared to other economies in Europe, Germany performs above average in all seven GII pillars.

OVERVIEW OF GERMANY RANKINGS IN THE SEVEN GII AREAS

Germany performs best in Human capital & research and its weakest performance is in Market sophistication.



*The highest possible ranking in each pillar is 1.

INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of the strengths and weaknesses of Germany in the GII 2020.

Strengths

Code	Indicator name	Rank
1.3.2	Ease of resolving insolvency*	4
2	Human capital & research	5
2.2	Tertiary education	6
2.2.2	Graduates in science & engineering, %	6
2.3	Research & development (R&D)	7
2.3.3	Global R&D companies, top 3, mn US$	2
3.1.1	ICT access*	7
3.2.2	Logistics performance*	1
4.3	Trade, competition, and market scale	6
4.3.3	Domestic market scale, bn PPP$	5
5.2.2	State of cluster development†	3
6.1	Knowledge creation	5
6.1.1	Patents by origin/bn PPP$ GDP	1
6.1.5	Citable documents H index	3
7.1	Intangible assets	7
7.3.2	Country-code TLDs/th pop. 15–69	6

Weaknesses

Code	Indicator name	Rank
1.2.3	Cost of redundancy dismissal, salary weeks	90
1.3.1	Ease of starting a business*	96
3.2.3	Gross capital formation, % GDP	79
4.1.1	Ease of getting credit*	44
4.2	Investment	75
4.2.1	Ease of protecting minority investors*	60
5.3.4	FDI net inflows, % GDP	74
6.2.1	Growth rate of PPP$ GDP/worker, %	84
6.2.2	New businesses/th pop. 15–64	73
7.2.2	National feature films/mn pop. 15–69	49
7.2.4	Printing & other media, % manufacturing	56

NOTES: * indicates an index; † indicates a survey question. Strengths and weaknesses are listed for pillars and/or sub-pillars where the data minimum coverage (DMC) requirements were not met. For the sake of caution, these ranks are shown in square brackets [ ] in the country profile. This is to ensure that incomplete data coverage does not lead to erroneous conclusions being made about strengths or weaknesses, in particular about strong or weak sub-pillar rankings.

STRENGTHS

GII strengths for Germany are found in all GII pillars.

- Institutions (18): the indicator Ease of resolving insolvency (4) demonstrates a strength.
- Human capital & research (5): shows strengths in the sub-pillars Tertiary education (6) and Research & development (7) and in the indicators Graduates in science & engineering (6) and R&D-intensive global companies (2).
- Infrastructure (12): demonstrates strengths in the indicators ICT access (7) and Logistics performance (1).
- Market sophistication (24): displays strengths in the sub-pillar Trade, competition, and market scale (6) and in its indicator Domestic market scale (5).
- Business sophistication (12): the indicator State of cluster development (3) demonstrates a strength.
- Knowledge & technology outputs (10): reveals strengths in the sub-pillar Knowledge creation (5) and in two of its indicators – Patents by origin (1) and Quality of scientific publications (3).
- Creative outputs (9): shows strengths in the sub-pillar Intangible assets (7) and in the indicator Top level domains (6).

WEAKNESSES

GII weaknesses for Germany are found in six of the seven GII pillars.

- Institutions (18): Germany exhibits weaknesses in the indicators Cost of redundancy dismissal (90) and Ease of starting a business (96).
- Infrastructure (12): the indicator Gross capital investment (79) reveals a weakness.
- Market sophistication (24): shows weaknesses in the sub-pillar Investment (75) and in the indicators Ease of getting credit (44) and Ease of protecting minority investors (60).
- Business sophistication (12): the indicator FDI net inflows (74) reveals a weakness.
- Knowledge & technology outputs (10): displays weaknesses in the indicators Productivity growth (84) and New businesses (73).
- Creative outputs (9): shows weaknesses in the indicators National feature films (49) and Printing & other media (56).

GERMANY

GII 2020 rank

9

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$	GDP per capita, PPP$	GII 2019 rank
7	14	High	EUR	83.5	4,444.4	46,765.5	9

		Score/Value	Rank	
INSTITUTIONS		**84.6**	**18**	
1.1	**Political environment**	**86.1**	**14**	
1.1.1	Political and operational stability*	85.7	17	
1.1.2	Government effectiveness*	86.3	13	
1.2	**Regulatory environment**	**80.9**	**28**	
1.2.1	Regulatory quality*	87.9	12	
1.2.2	Rule of law*	89.2	16	
1.2.3	Cost of redundancy dismissal, salary weeks	21.6	90	○ ◇
1.3	**Business environment**	**86.7**	**14**	
1.3.1	Ease of starting a business*	83.7	96	○ ◇
1.3.2	Ease of resolving insolvency*	89.8	4	● ◆
HUMAN CAPITAL & RESEARCH		**61.1**	**5**	●
2.1	**Education**	**54.6**	**38**	
2.1.1	Expenditure on education, % GDP ⊙	4.8	50	
2.1.2	Government funding/pupil, secondary, % GDP/cap	23.0	28	
2.1.3	School life expectancy, years	17.0	17	
2.1.4	PISA scales in reading, maths, & science	500.4	18	
2.1.5	Pupil-teacher ratio, secondary ⊙	12.0	54	
2.2	**Tertiary education**	**56.1**	**6**	●
2.2.1	Tertiary enrolment, % gross	70.2	28	
2.2.2	Graduates in science & engineering, %	35.6	6	● ◆
2.2.3	Tertiary inbound mobility, %	8.4	25	
2.3	**Research & development (R&D)**	**72.7**	**7**	●
2.3.1	Researchers, FTE/mn pop	5,211.9	15	
2.3.2	Gross expenditure on R&D, % GDP	3.1	7	
2.3.3	Global R&D companies, avg. exp. top 3, mn $US	95.6	2	● ◆
2.3.4	QS university ranking, average score top 3*	70.1	10	
INFRASTRUCTURE		**58.0**	**12**	
3.1	**Information & communication technologies (ICTs)**	**88.5**	**15**	
3.1.1	ICT access*	88.5	7	●
3.1.2	ICT use*	80.3	20	
3.1.3	Government's online service*	93.1	17	
3.1.4	E-participation*	92.1	23	
3.2	**General infrastructure**	**42.1**	**19**	
3.2.1	Electricity output, kWh/mn pop	7,764.6	27	
3.2.2	Logistics performance*	100.0	1	● ◆
3.2.3	Gross capital formation, % GDP	21.8	79	○
3.3	**Ecological sustainability**	**43.5**	**31**	
3.3.1	GDP/unit of energy use	12.3	32	
3.3.2	Environmental performance*	77.2	10	
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	1.9	48	
MARKET SOPHISTICATION		**56.1**	**24**	
4.1	**Credit**	**51.9**	**29**	
4.1.1	Ease of getting credit*	70.0	44	○
4.1.2	Domestic credit to private sector, % GDP	77.7	38	◇
4.1.3	Microfinance gross loans, % GDP	n/a	n/a	
4.2	**Investment**	**35.1**	**75**	○ ◇
4.2.1	Ease of protecting minority investors*	62.0	60	○
4.2.2	Market capitalization, % GDP	51.9	31	
4.2.3	Venture capital deals/bn PPP$ GDP	0.1	23	
4.3	**Trade, competition, and market scale**	**81.2**	**6**	●
4.3.1	Applied tariff rate, weighted avg., %	1.7	22	
4.3.2	Intensity of local competition+	76.3	18	
4.3.3	Domestic market scale, bn PPP$	4,444.4	5	●

		Score/Value	Rank	
BUSINESS SOPHISTICATION		**53.7**	**12**	
5.1	**Knowledge workers**	**65.0**	**11**	
5.1.1	Knowledge-intensive employment, %	45.2	17	
5.1.2	Firms offering formal training, %	n/a	n/a	
5.1.3	GERD performed by business, % GDP	2.2	7	
5.1.4	GERD financed by business, %	66.2	7	
5.1.5	Females employed w/advanced degrees, %	13.5	51	◇
5.2	**Innovation linkages**	**53.7**	**13**	
5.2.1	University/industry research collaboration+	70.7	8	
5.2.2	State of cluster development+	73.5	3	● ◆
5.2.3	GERD financed by abroad, % GDP	0.2	21	
5.2.4	JV-strategic alliance deals/bn PPP$ GDP	0.1	30	◇
5.2.5	Patent families 2+ offices/bn PPP$ GDP	5.6	9	
5.3	**Knowledge absorption**	**42.5**	**26**	
5.3.1	Intellectual property payments, % total trade	0.8	49	
5.3.2	High-tech imports, % total trade	9.9	34	
5.3.3	ICT services imports, % total trade	2.1	25	
5.3.4	FDI net inflows, % GDP	2.3	74	○
5.3.5	Research talent, % in business enterprise	60.4	15	
KNOWLEDGE & TECHNOLOGY OUTPUTS		**51.7**	**10**	
6.1	**Knowledge creation**	**68.0**	**5**	●
6.1.1	Patents by origin/bn PPP$ GDP	16.9	1	● ◆
6.1.2	PCT patents by origin/bn PPP$ GDP	4.4	9	
6.1.3	Utility models by origin/bn PPP$ GDP	2.0	11	
6.1.4	Scientific & technical articles/bn PPP$ GDP	16.8	34	
6.1.5	Citable documents H-index	87.4	3	● ◆
6.2	**Knowledge impact**	**41.3**	**15**	
6.2.1	Growth rate of PPP$ GDP/worker, %	0.3	84	○
6.2.2	New businesses/th pop. 15-64	1.4	73	○
6.2.3	Computer software spending, % GDP	0.0	18	
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	11.5	25	
6.2.5	High- and medium-high-tech manufacturing, %	56.5	7	
6.3	**Knowledge diffusion**	**45.8**	**17**	
6.3.1	Intellectual property receipts, % total trade	1.3	17	
6.3.2	High-tech net exports, % total trade	12.1	12	
6.3.3	ICT services exports, % total trade	2.3	44	
6.3.4	FDI net outflows, % GDP	3.6	16	
CREATIVE OUTPUTS		**49.1**	**9**	
7.1	**Intangible assets**	**54.8**	**7**	●
7.1.1	Trademarks by origin/bn PPP$ GDP	61.1	33	
7.1.2	Global brand value, top 5,000, % GDP	143.4	11	
7.1.3	Industrial designs by origin/bn PPP$ GDP	13.7	7	◆
7.1.4	ICTs & organizational model creation+	78.0	8	
7.2	**Creative goods and services**	**27.6**	**33**	
7.2.1	Cultural & creative services exports, % total trade	0.9	31	
7.2.2	National feature films/mn pop. 15-69	4.0	49	○
7.2.3	Entertainment & Media market/th pop. 15-69	57.1	12	
7.2.4	Printing and other media, % manufacturing	1.0	56	○
7.2.5	Creative goods exports, % total trade	2.1	28	
7.3	**Online creativity**	**59.1**	**11**	
7.3.1	Generic top-level domains (TLDs)/th pop. 15-69	52.5	14	
7.3.2	Country-code TLDs/th pop. 15-69	84.5	6	● ◆
7.3.3	Wikipedia edits/mn pop. 15-69	86.4	11	
7.3.4	Mobile app creation/bn PPP$ GDP	13.7	35	

NOTES: ● indicates a strength; ○ a weakness; ◆ a strength relative to the other top 25-ranked GII economies; ◇ a weakness relative to the other top 25-ranked GII economies; * an index; + a survey question. ⊙ indicates that the economy's data are older than the base year; see Appendix II for details, including the year of the data, at http://globalinnovationindex.org. 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 data that are either missing or outdated for Germany.

Missing data

Code	Indicator name	Country year	Model year	Source
4.1.3	Microfinance gross loans, % GDP	n/a	2018	Microfinance Information Exchange
5.1.2	Firms offering formal training, %	n/a	2018	World Bank

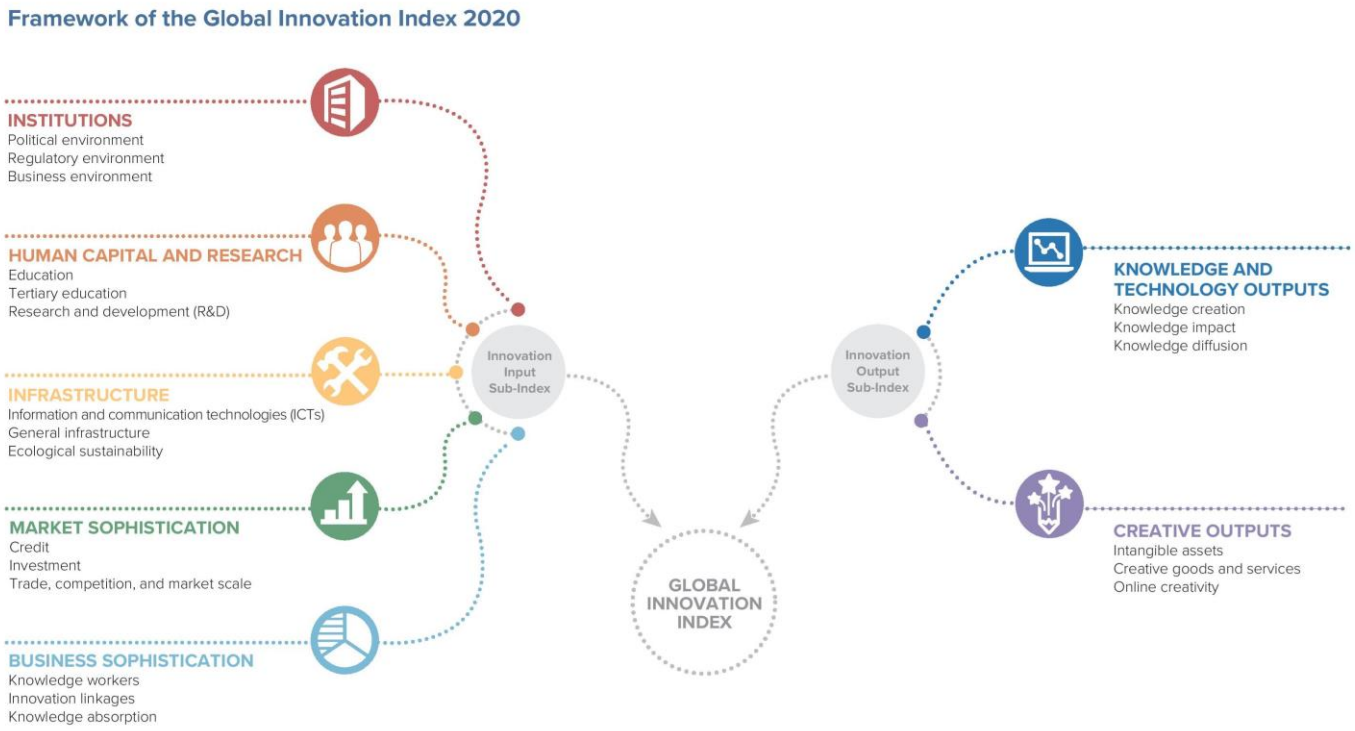
Outdated data

Code	Indicator name	Country year	Model year	Source
2.1.1	Expenditure on education, % GDP	2016	2018	UNESCO Institute for Statistics
2.1.5	Pupil-teacher ratio, secondary	2017	2018	UNESCO Institute for Statistics

ABOUT THE GLOBAL INNOVATION INDEX

The Global Innovation Index (GII) is co-published by Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO), a specialized agency of the United Nations. In 2020, the GII presents its 13th edition devoted to the theme *Who Will Finance Innovation?*

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.