GLOBAL INNOVATION INDEX 2019

GERMANY

9th Germany ranks 9th among the 129 economies featured in the GII 2019.

The Global Innovation Index (GII) is a ranking of world economies based on 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 the GII model influence year-on-year comparisons of the GII ranks. The confidence interval for Germany's ranking in the GII 2019 is between 7 and 9.

Germany's Rankings, 2017 - 2019

	GII	Innovation Inputs	Innovation Outputs
2019	9	12	9
2018	9	17	5
2017	9	17	7

- Germany performs better in Innovation Outputs than Inputs.
- This year Germany ranks 12th in Innovation Inputs, better than last year and compared to 2017.
- As for Innovation Outputs, Germany ranks 9th. This position is worse than last year and compared to 2017.

9th Germany ranks 9th among the 50 high-income economies.

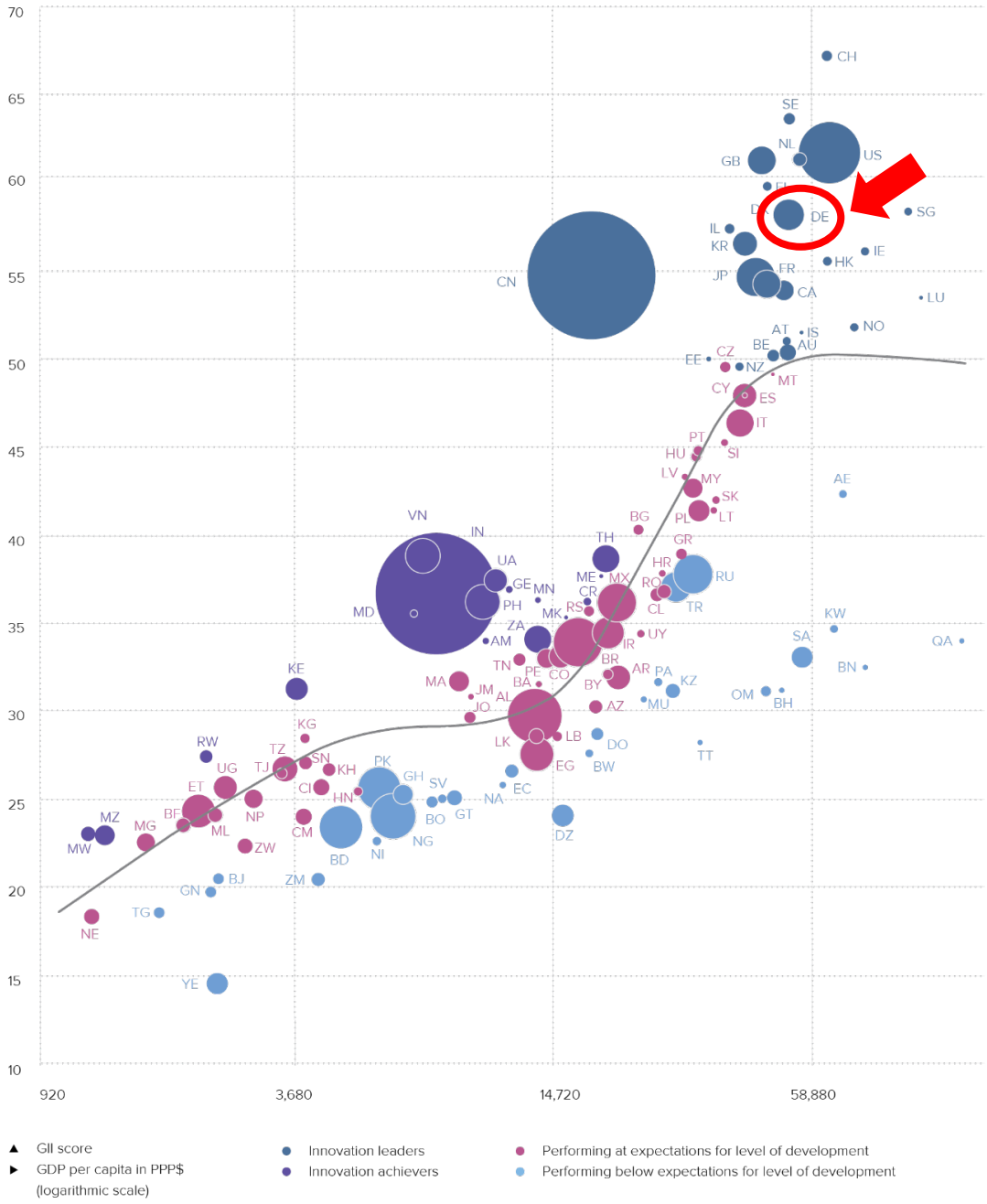
7th Germany ranks 7th among the 39 economies in Europe.

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 considered Innovation under-performers relative to GDP.

Relative to GDP, Germany performs well above its expected level of development.

GII scores and GDP per capita in PPP US$
(bubbles sized by population)

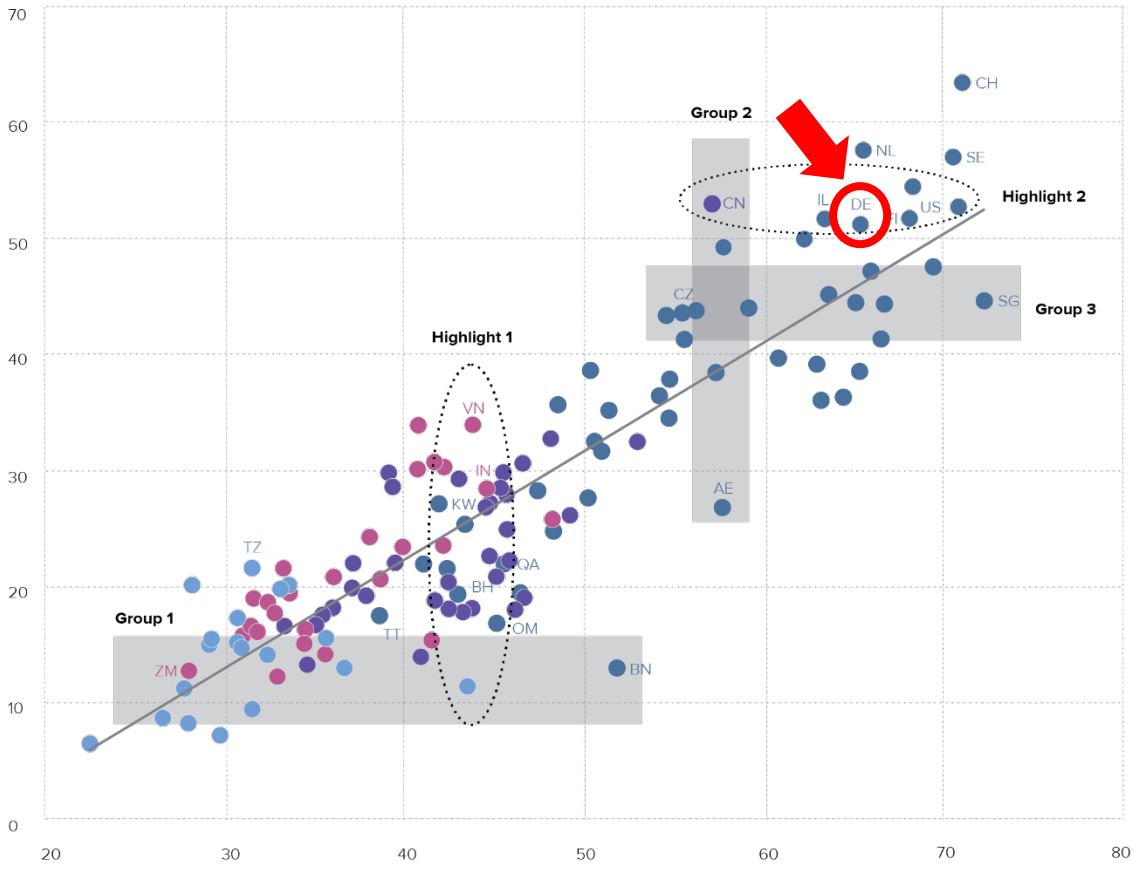


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

The chart below shows the relationship between innovation inputs and innovation outputs, indicating which economies best translate innovation inputs into innovation outputs. Economies appearing above the line are effectively translating their costly innovation investments into more and higher-quality outputs. In contrast, those below the line are not effectively translating innovation inputs into outputs.

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

Innovation input/output performance by income group, 2019



▲ Output score
▶ Input score

● High income
● Upper-middle income

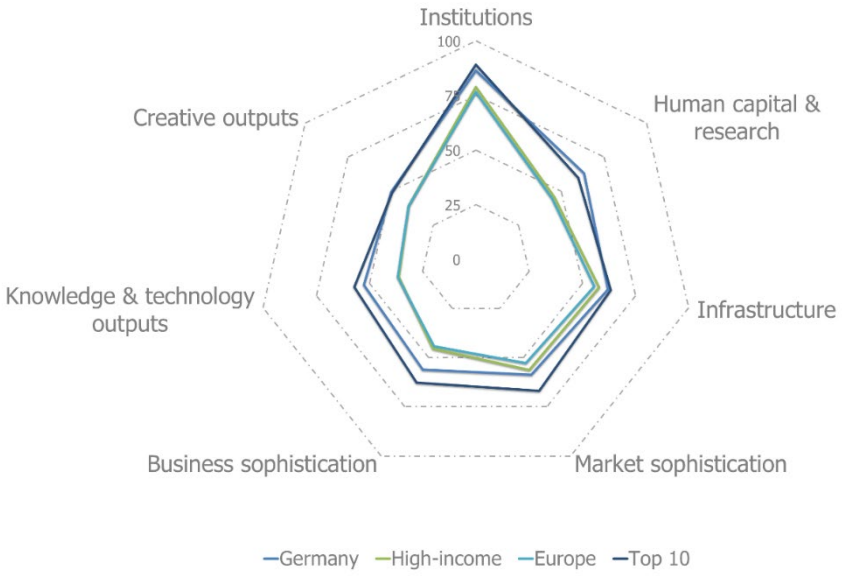
● Lower-middle income
● Low income

— Fitted values

AE	United Arab Emirates	CZ	Czech Republic	NL	Netherlands	TZ	United Republic of Tanzania
BH	Bahrain	DE	Germany	OM	Oman	US	United States of America
BN	Brunei Darussalam	FI	Finland	QA	Qatar	VN	Viet Nam
CH	Switzerland	IL	Israel	SE	Sweden	ZM	Zambia
CN	China	IN	India	SG	Singapore		
		KW	Kuwait	TT	Trinidad and Tobago		

BENCHMARKING GERMANY TO OTHER HIGH-INCOME ECONOMIES AND THE EUROPE REGION

Germany's scores in the seven GII pillars



High-income economies

Germany has high scores in all of the 7 GII pillars, which are above the average of the high-income group.

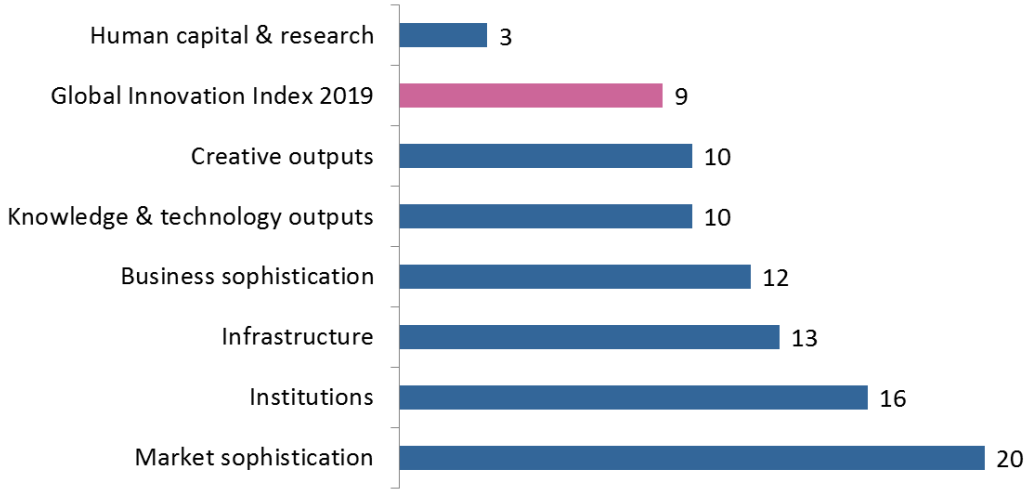
Europe Region

Compared to other economies in Europe, Germany performs above average in all of the 7 GII pillars.

Germany ranks in the top 10 in sub-pillars Tertiary education, Research & development (R&D), Trade, competition, & market scale, Innovation linkages, Knowledge creation, and Intangible assets.

OVERVIEW OF GERMANY'S RANKINGS IN THE 7 GII AREAS

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



*The highest possible ranking in each pillar is 1.

GERMANY'S INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of Germany's strengths and weaknesses in the GII 2019.

Strengths

Code	Indicator name	Rank
1.3.2	Ease of resolving insolvency*	4
2	Human capital & research	3
2.2	Tertiary education	5
2.2.2	Graduates in science & engineering, %	4
2.3.3	Global R&D companies, top 3, in mn US$	2
3.1.1	ICT access*	6
3.2.2	Logistics performance*	1
4.3	Trade, competition, & market scale	4
4.3.3	Domestic market scale, bn PPP$	5
5.2.2	State of cluster development†	2
6.1	Knowledge creation	6
6.1.1	Patents by origin/bn PPP$ GDP	1
6.1.5	Citable documents H index	3
7.1	Intangible assets	5
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	89
1.3.1	Ease of starting a business*	88
2.1.1	Expenditure on education, % GDP	55
3.2.3	Gross capital formation, % GDP	91
4.2	Investment	79
4.2.1	Ease of protecting minority investors*	68
5.2.3	GERD financed by abroad, %	60
5.3.4	FDI net inflows, % GDP, 3-year average	86
6.2.1	Growth rate of PPP$ GDP/worker, %, 3-year average	73
6.2.2	New businesses/th pop. 15–64	64
7.2.4	Printing & other media, % manufacturing	63

STRENGTHS

- GII strengths for Germany are found in all of the seven GII pillars.
- Pillar Human capital & research (3) is a notable GII strength of Germany.
- In Human capital & research (3), additional strengths are sub-pillar Tertiary education (5) and indicators Graduates in science & engineering (4) and Global R&D companies (2).
- In Knowledge & technology outputs (10), sub-pillar Knowledge creation (6) as well as two of its indicators – Patents by origin and Quality of scientific publications - are GII strengths. In Patents by origin, Germany ranks first in the world; in Quality of scientific publications it achieves the third spot.
- In Institutions (16), indicator Ease of resolving insolvency (4) is a strength for Germany.
- In Infrastructure (13), Germany has GII strengths in indicators ICT access (6) and Logistics performance, where it positions 1st globally.
- In Market sophistication (20), sub-pillar Trade, competition, & market scale (4) and indicator Domestic market scale (5) are strength of this country.
- In Business sophistication (12), Germany's only strength is indicator State of cluster development, where it ranks 2nd in the world.
- Sub-pillar Intangible assets (5) and indicator Country-code TLDs (6) are strengths in Creative outputs (10).

WEAKNESSES

- Germany weaknesses in the GII are found in all of the seven GII pillars.
- In Institutions (16), relative weaknesses are two indicators: Cost of redundancy dismissal (89) and Ease of starting a business (88).
- In Human capital & research (3), indicator Expenditure on education (55) is the only relative weakness for Germany.
- In Infrastructure (13), Germany shows weakness in indicator Gross capital formation (91).
- In Market sophistication (20), sub-pillar Investment (79) and its indicator Ease of protecting minority investors (68) are GII weaknesses for Germany.
- In Business sophistication (12), Germany's weaknesses are indicators R&D financed by abroad (60) and FDI inflows (86).
- Indicators Labor productivity growth (73) and New businesses (64) are relative GII weaknesses in Knowledge & technology outputs (10).
- In Creative outputs (10), Germany has only one weakness in indicator Printing & other media (63).

GERMANY

GII 2019 rank

9

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$	GDP per capita, PPP$	GII 2018 rank
9	**12**	**High**	**EUR**	**82.3**	**4,379.1**	**52,558.7**	**9**

		Score/Value	Rank	
INSTITUTIONS		**86.4**	**16**	
1.1	**Political environment**	**88.1**	**13**	
1.1.1	Political and operational stability*	87.7	18	
1.1.2	Government effectiveness*	88.2	11	
1.2	**Regulatory environment**	**84.4**	**23**	
1.2.1	Regulatory quality*	89.8	11	
1.2.2	Rule of law*	88.9	16	
1.2.3	Cost of redundancy dismissal, salary weeks	21.6	89	○ ◇
1.3	**Business environment**	**86.9**	**15**	
1.3.1	Ease of starting a business*	83.6	88	○ ◇
1.3.2	Ease of resolving insolvency*	90.1	4	● ◆
HUMAN CAPITAL & RESEARCH		**63.2**	**3**	● ◆
2.1	**Education**	**57.8**	**33**	
2.1.1	Expenditure on education, % GDP	4.8	55	○
2.1.2	Government funding/pupil, secondary, % GDP/cap	23.0	34	
2.1.3	School life expectancy, years	17.1	17	
2.1.4	PISA scales in reading, maths, & science	508.1	11	
2.1.5	Pupil-teacher ratio, secondary 🕘	12.0	48	
2.2	**Tertiary education**	**58.6**	**5**	● ◆
2.2.1	Tertiary enrolment, % gross 🕘	68.3	31	
2.2.2	Graduates in science & engineering, %	36.0	4	● ◆
2.2.3	Tertiary inbound mobility, %	8.0	28	
2.3	**Research & development (R&D)**	**73.4**	**7**	
2.3.1	Researchers, FTE/mn pop	5,036.2	12	
2.3.2	Gross expenditure on R&D, % GDP	3.0	8	
2.3.3	Global R&D companies, avg. exp. top 3, mn US$	97.2	2	● ◆
2.3.4	QS university ranking, average score top 3*	69.1	11	
INFRASTRUCTURE		**62.0**	**13**	
3.1	**Information & communication technologies(ICTs)**	**88.2**	**15**	
3.1.1	ICT access*	90.3	6	●
3.1.2	ICT use*	77.2	22	
3.1.3	Government's online service*	93.1	17	
3.1.4	E-participation*	92.1	23	
3.2	**General infrastructure**	**47.8**	**26**	
3.2.1	Electricity output, kWh/mn pop	7,849.4	22	
3.2.2	Logistics performance*	100.0	1	● ◆
3.2.3	Gross capital formation, % GDP	20.4	91	○
3.3	**Ecological sustainability**	**50.1**	**29**	
3.3.1	GDP/unit of energy use	11.6	34	
3.3.2	Environmental performance*	78.4	13	
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	2.4	41	
MARKET SOPHISTICATION		**58.6**	**20**	
4.1	**Credit**	**53.2**	**28**	
4.1.1	Ease of getting credit*	70.0	40	
4.1.2	Domestic credit to private sector, % GDP	77.7	39	◇
4.1.3	Microfinance gross loans, % GDP	n/a	n/a	
4.2	**Investment**	**39.7**	**79**	○ ◇
4.2.1	Ease of protecting minority investors*	58.3	68	○
4.2.2	Market capitalization, % GDP	53.9	31	
4.2.3	Venture capital deals/bn PPP$ GDP	0.1	20	
4.3	**Trade, competition, & market scale**	**82.9**	**4**	●
4.3.1	Applied tariff rate, weighted avg., %	1.8	23	
4.3.2	Intensity of local competition†	76.3	18	
4.3.3	Domestic market scale, bn PPP$	4,379.1	5	● ◆

		Score/Value	Rank	
BUSINESS SOPHISTICATION		**56.1**	**12**	
5.1	**Knowledge workers**	**67.1**	**13**	
5.1.1	Knowledge-intensive employment, %	44.7	17	
5.1.2	Firms offering formal training, % firms	n/a	n/a	
5.1.3	GERD performed by business, % GDP	2.1	7	
5.1.4	GERD financed by business, %	65.2	7	
5.1.5	Females employed w/advanced degrees, %	13.2	51	◇
5.2	**Innovation linkages**	**53.9**	**10**	
5.2.1	University/industry research collaboration†	72.8	6	
5.2.2	State of cluster development†	75.4	2	● ◆
5.2.3	GERD financed by abroad, %	5.9	60	○
5.2.4	JV-strategic alliance deals/bn PPP$ GDP	0.0	32	◇
5.2.5	Patent families 2+ offices/bn PPP$ GDP	5.9	9	
5.3	**Knowledge absorption**	**47.5**	**22**	
5.3.1	Intellectual property payments, % total trade	0.8	51	
5.3.2	High-tech imports, % total trade	9.6	37	
5.3.3	ICT services imports, % total trade	2.1	25	
5.3.4	FDI net inflows, % GDP	1.8	86	○
5.3.5	Research talent, % in business enterprise	59.7	15	
KNOWLEDGE & TECHNOLOGY OUTPUTS		**52.7**	**10**	
6.1	**Knowledge creation**	**66.6**	**6**	●
6.1.1	Patents by origin/bn PPP$ GDP	17.5	1	● ◆
6.1.2	PCT patents by origin/bn PPP$ GDP	4.5	9	
6.1.3	Utility models by origin/bn PPP$ GDP	2.3	9	
6.1.4	Scientific & technical articles/bn PPP$ GDP	15.7	35	
6.1.5	Citable documents H-index	87.9	3	● ◆
6.2	**Knowledge impact**	**48.7**	**17**	
6.2.1	Growth rate of PPP$ GDP/worker, %	0.6	73	○
6.2.2	New businesses/th pop. 15-64	1.3	64	○
6.2.3	Computer software spending, % GDP	0.6	18	
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	15.4	22	
6.2.5	High- & medium-high-tech manufactures, %	0.6	6	
6.3	**Knowledge diffusion**	**42.7**	**17**	
6.3.1	Intellectual property receipts, % total trade	1.2	17	
6.3.2	High-tech net exports, % total trade	11.5	14	
6.3.3	ICT services exports, % total trade	2.3	46	
6.3.4	FDI net outflows, % GDP	3.3	22	
CREATIVE OUTPUTS		**49.6**	**10**	
7.1	**Intangible assets**	**63.8**	**5**	● ◆
7.1.1	Trademarks by origin/bn PPP$ GDP	65.2	30	
7.1.2	Industrial designs by origin/bn PPP$ GDP	14.5	6	◆
7.1.3	ICTs & business model creation†	78.4	12	
7.1.4	ICTs & organizational model creation†	78.0	8	
7.2	**Creative goods & services**	**26.3**	**41**	
7.2.1	Cultural & creative services exports, % total trade	0.9	33	
7.2.2	National feature films/mn pop. 15-69	4.1	47	
7.2.3	Entertainment & Media market/th pop. 15-69	58.7	12	
7.2.4	Printing & other media, % manufacturing	1.0	63	○
7.2.5	Creative goods exports, % total trade	2.2	26	
7.3	**Online creativity**	**44.4**	**14**	
7.3.1	Generic top-level domains (TLDs)/th pop. 15-69	52.9	14	
7.3.2	Country-code TLDs/th pop. 15-69	77.6	6	● ◆
7.3.3	Wikipedia edits/mn pop. 15-69	52.1	22	
7.3.4	Mobile app creation/bn PPP$ GDP	11.9	40	

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 missing or are outdated for Germany.

Missing data

Code	Indicator name	Country year	Model year	Source
4.1.3	Microfinance gross loans, % GDP	n/a	2017	Microfinance Information Exchange
5.1.2	Firms offering formal training, % firms	n/a	2013	World Bank

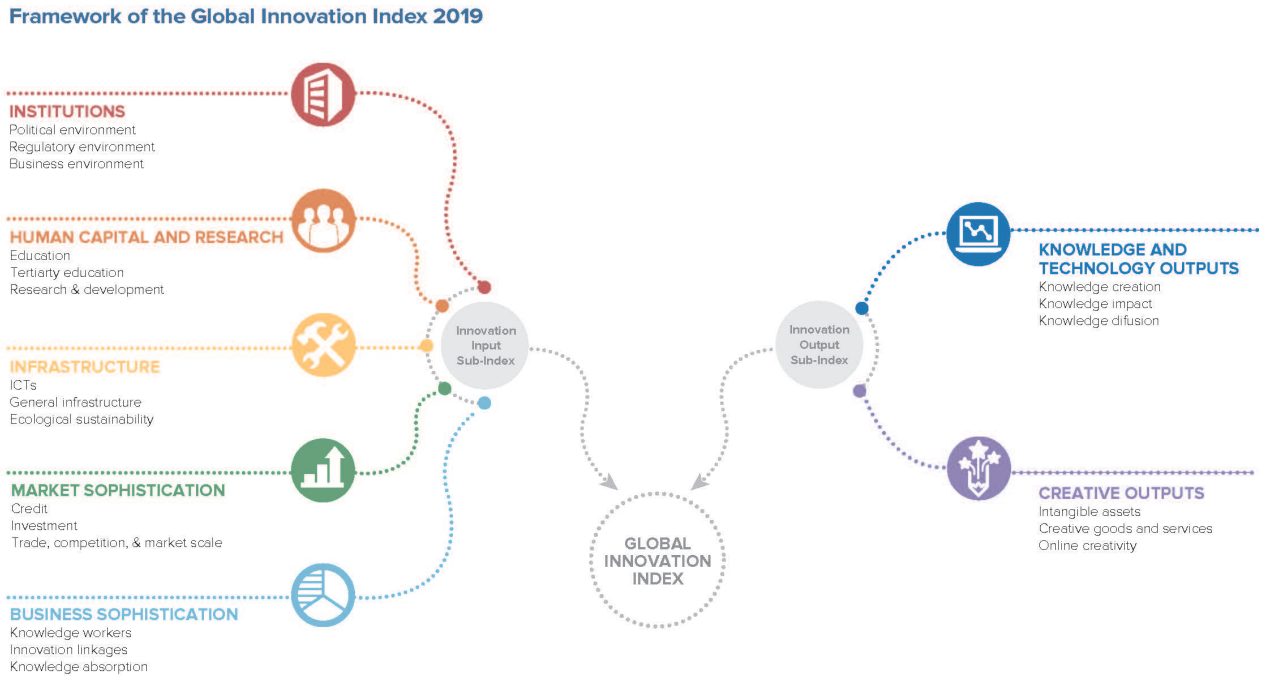
Outdated data

Code	Indicator name	Country year	Model year	Source
2.1.5	Pupil-teacher ratio, secondary	2016	2017	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	2016	2017	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 2019, the GII presents its 12th edition devoted to the theme **Creating Healthy Lives—The Future of Medical Innovation**.

Recognizing that innovation is a key driver of economic development, the GII aims to provide a rich innovation ranking and 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 countries 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 includes 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 containing three sub-pillars.