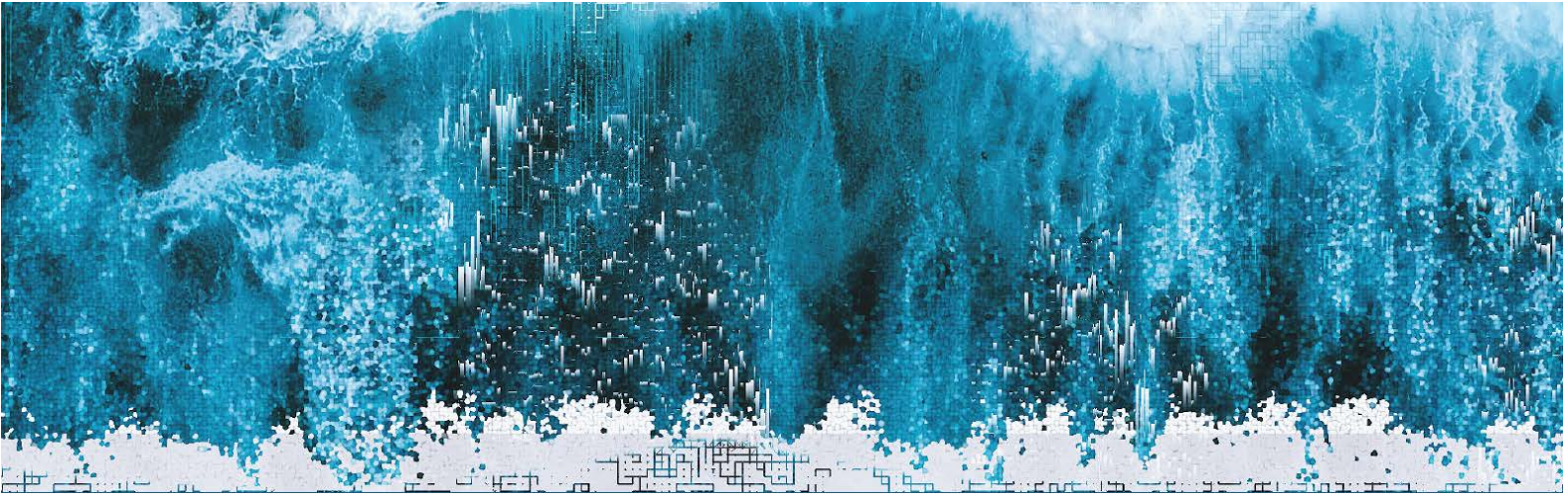


GLOBAL INNOVATION INDEX 2018

China

17th China is ranked 17th in the GII 2018, moving up 5 positions from the previous year.

China broke into the world's top 20 most-innovative economies this year, ranking 17th in the GII 2018 and being the only middle-income economy in the top 25. China's rise in the GII rankings is extraordinary: only in 2018 China gains five positions from 2017. China is also moving closer to the top 10 in indicators related to the quality of its institutions, the development of its market and its business sector. These important achievements are reinforced by a strong performance in innovation outputs, where China breaks in the top 10 this year for the first time.

In absolute values, China is among the largest world contributors in terms of many innovation inputs and outputs, including R&D spending, number of researchers, scientific and technological publications, and patent applications. In the GII rankings, China earns top positions in a number of important areas, including patents and utility models, high-tech exports, but also trademarks, industrial designs, and creative goods exports. Other areas of comparative strength include capital investment, firms offering formal training, and high-tech imports (for a complete list, see pages 3 and 4 of this brief).

China is second in the world (after the United States of America) in number of innovative clusters, with 18 clusters identified this year. Shenzhen–Hong Kong and Beijing are in the top 5 world clusters in terms of international patent filings. The country also remains the top middle-income economy for the sixth consecutive year in the GII indicators that capture the quality of innovation. It is the only country closing the gap with the high-income group. In the quality of scientific publications and the quality of its universities, China performs above the high-income group average, and, in the latter indicator, above the score of top-ranked Japan. This reflects the high-quality scores achieved by Tsinghua, Peking, and Fudan Universities this year.

For all the factors mentioned above, China has constantly over-performed in innovation compared to its level of development (see also page 5 of this brief).

The GII indicators are grouped into innovation inputs and outputs. Innovation inputs capture the efforts made by the country to boost innovation. Innovation outputs measure the results of these efforts in terms of scientific publications, patents, trademarks, production, exports and other

outputs. The table below presents China's ranking over time in the overall GII, the Innovation Input and Output Sub-Indices – which summarize China's performance in innovation input and output indicators–, and in the Efficiency Ratio – which captures how well the economy translates innovation inputs into more outputs.[1]

China's rankings over time

	GII	Input	Output	Efficiency
2018	17	27	10	3
2017	22	31	11	3
2016	25	29	15	7

- Over the last three years, China has improved its ranking in innovation outputs, entering the top 10 in the Innovation Output Sub-Index where it reaches the 10th global position this year.
- Innovation inputs also improve this year, with the Innovation Input Sub-Index reaching the 27th position, up from the 31st in 2017 and 29th in 2016.
- China's Innovation Efficiency Ratio is also very strong, demonstrating that China is good at translating its innovation inputs into more outputs. This year, China ranks 3rd globally for the second consecutive year, up from the 7th position in 2016. The Efficiency Ratio is positively influenced by a much higher ranking in Innovation Outputs (10th) than Inputs (27th).

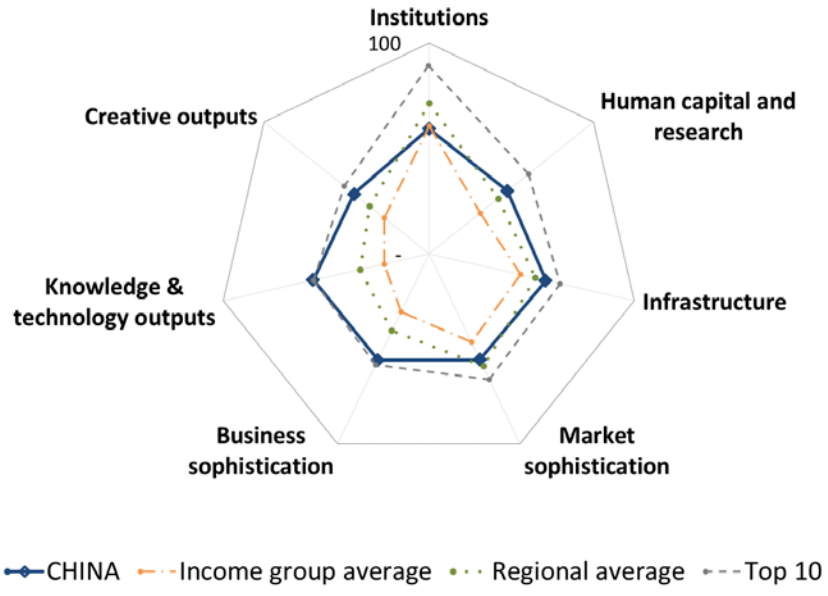
1st China is ranked 1st among the 34 upper-middle-income economies in the GII 2018.

5th China is ranked 5th among the 15 economies in South East Asia and Oceania in the GII 2018.

[1] Note that year-on-year comparisons of the GII ranks are imperfect and influenced by changes in the GII model and data availability.

Benchmarking China to other upper-middle-income countries and the South East Asia and Oceania region

China's scores by area



Upper-middle-income countries

China has high scores in 6 GII areas – **Human Capital and Research, Infrastructure, Market Sophistication, Business Sophistication, Knowledge and Technology Outputs** and **Creative Outputs**, in which it scores above the average of the upper-middle-income group.

Top scores in *Education, General infrastructure, Trade, competition & market scale, Knowledge workers, Knowledge creation,* and *Intangible assets* are behind these high rankings.

South East Asia and Oceania region

Compared to other countries in the South East Asia and Oceania region, China performs above average in 5 areas: Human Capital and Research, Infrastructure, Business Sophistication, Knowledge and Technology Outputs, and Creative Outputs.

China's innovation profile

Strengths

- China's major strength is the **Innovation Efficiency Ratio**, in which it ranks number 3 in the world.

- Most of its relative strengths are in innovation outputs. In **Knowledge and Technology Outputs** (5th), it present strengths in *Knowledge creation* (4th) and *Knowledge impact* (2nd). At the variable level strengths lie in *Patent applications by origin*, *Utility models by origin,* and *High-tech exports* – all ranking number 1 globally, as well as in *Productivity growth*, ranking 3rd in the world.

- In **Creative Outputs** (21st), strengths are shown in *Intangible assets* (1st) as well as in indicators *Trademarks by origin* (3rd), *Industrial designs by origin* (1st), and *Creative goods exports* (1st).

- Among innovation inputs, in **Infrastructure** (29th), China has strengths in *General infrastructure* and in indicator in *Gross capital formation*, ranking 3rd and 4th respectively.

- In **Market sophistication** (25th), and due to the size of its economy, strengths lie in *Trade, competition, and market scale* and in the indicator *Domestic market scale*, ranking 2nd and 1st in the world, respectively.

- In **Business sophistication** (9th), China shows strong performance in *Knowledge workers* (1st) as well as in indicators *Firms offering formal training* (1st), *R&D financed by business* (2nd), and *High-tech imports* (3rd).

Weaknesses

- In **Institutions** (70th), China has relative weaknesses in *Regulatory environment* (100th) as well as in indicator *Cost of redundancy dismissal* (103rd).

- In **Human capital and research** (23rd), indicator *Tertiary inbound mobility* (97th) is marked as a weakness.

- In **Infrastructure** (29th), the indicator *GDP per unit of energy use* (94th) is identified as another relative weakness.

- In **Market Sophistication** (25th), relative weaknesses lie in indicators *Microfinance gross loans* (70th) and *Ease of protecting minority investors* (97th).

- In **Business Sophistication** (9th), China performs relatively weakly in *R&D financed by abroad* (94th).

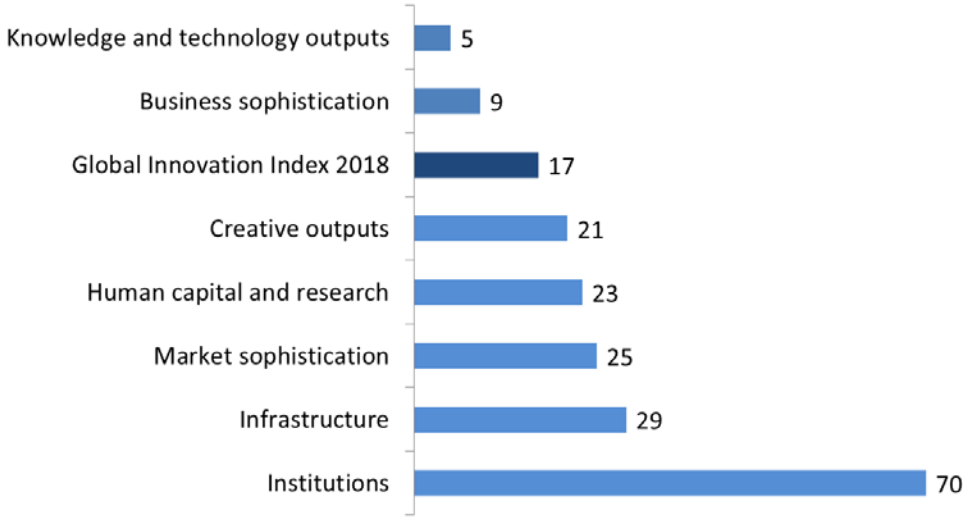
- In **innovation outputs**, China demonstrates relative weaknesses only in **Creative Outputs** (21st), where weaknesses are found in *Cultural and creative services exports* (67th), *National feature films* (88th), *Printing and other media* (74th), and *Wikipedia edits* (111th).

The following figure presents a summary of China's ranks in the 7 GII areas, as well as the overall rank in the GII 2018.

China's rank in the GII 2018 and the 7 GII areas

Rank 1 is the highest possible in each pillar

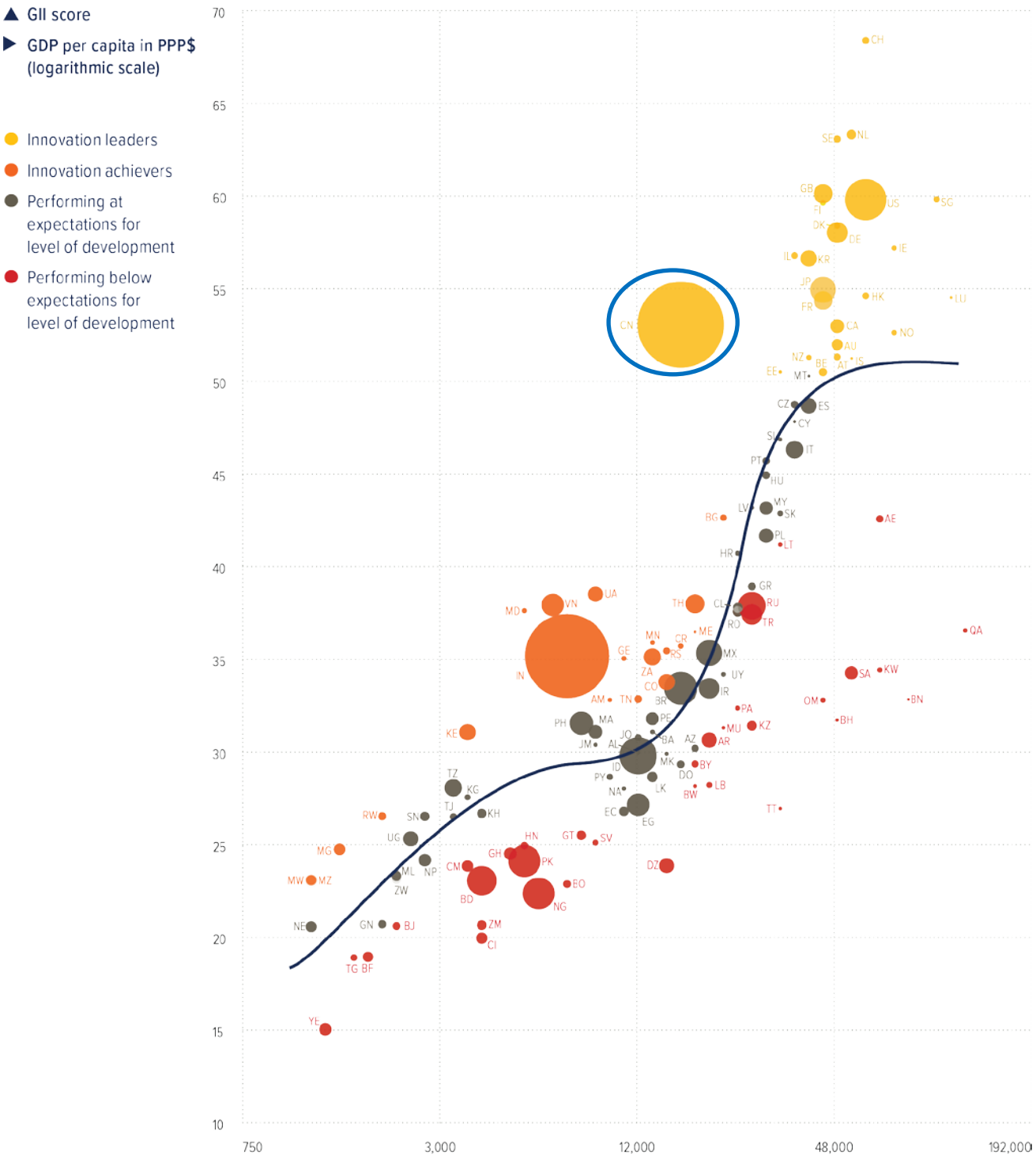
Total number of countries: 126



Expected vs. Observed Innovation Performance

The GII bubble chart shows the relationship between income levels (GDP per capita) and innovation performance (GII score). The depicted trendline gives an indication of the expected innovation performance at different levels of income. Countries located above the trendline are performing better that what would be expected based on their income level. Countries below the line are Innovation Under-performers relative to GDP.

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



Missing and Outdated Data

More and better data improve the ability of a country to understand its strengths and weaknesses and give policymakers greater capacity to plan and adapt public policies accordingly. The GII 2018 covers 126 countries that complied with the minimum indicator coverage of 35 indicators in the Innovation Input Sub-Index (66%) and 18 indicators in the Innovation Output Sub-Index (66%).

The following tables show data for China that is not available or that is outdated.

Missing Data

Code	Indicator	Country Year	Model Year	Source
2.1.1	Expenditure on education, % GDP	n/a	2014	UNESCO Institute for Statistics
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	2014	UNESCO Institute for Statistics
2.2.2	Graduates in science & engineering, %	n/a	2016	UNESCO Institute for Statistics
5.1.1	Knowledge-intensive employment, %	n/a	2016	ILO, ILOSTAT
5.1.5	Females employed w/advanced degrees, %	n/a	2016	ILO, ILOSTAT
6.2.2	New businesses/th pop. 15–64	n/a	2016	World Bank, Doing Business
7.3.4	Mobile app creation/bn PPP$ GDP	n/a	2017	App Annie Intelligence

Outdated Data

Code	Indicator	Country Year	Model Year	Source
2.1.3	School life expectancy, years	2013	2016	UNESCO Institute for Statistics
5.1.2	Firms offering formal training, % firms	2012	2013	World Bank, Enterprise Surveys
7.2.1	Cultural & creative services exports, % total trade	2015	2016	WTO, Trade in Commercial Services

CHINA

GII 2018 rank **17**

Output rank	Input rank	Income	Region	Efficiency ratio	Population (mn)	GDP, PPP$	GDP per capita, PPP$	GII 2017 rank
10	27	Upper-middle	SEAO	3 ●	1,409.5	23,122.0	16,660.3	22

		Score/Value	Rank	
	Institutions	**59.4**	**70**	
1.1	Political environment	53.6	60	
1.1.1	Political stability & safety*	52.6	91	
1.1.2	Government effectiveness*	54.1	48	
1.2	Regulatory environment	54.0	100	○
1.2.1	Regulatory quality*	37.3	87	
1.2.2	Rule of law*	37.8	75	
1.2.3	Cost of redundancy dismissal, salary weeks	27.4	103	○
1.3	Business environment	70.6	59	
1.3.1	Ease of starting a business*	85.5	73	
1.3.2	Ease of resolving insolvency*	55.8	52	
	Human capital & research	**47.8**	**23**	◆
2.1	Education	63.9	13	◆
2.1.1	Expenditure on education, % GDP	n/a	n/a	
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	n/a	
2.1.3	School life expectancy, years[d]	13.5	71	
2.1.4	PISA scales in reading, maths & science	514.3	8	◆
2.1.5	Pupil-teacher ratio, secondary	13.5	57	
2.2	Tertiary education	20.4	94	◇
2.2.1	Tertiary enrolment, % gross	48.4	55	
2.2.2	Graduates in science & engineering, %	n/a	n/a	
2.2.3	Tertiary inbound mobility, %	0.3	97	○
2.3	Research & development (R&D)	59.1	17	◆
2.3.1	Researchers, FTE/mn pop.	1,205.7	47	
2.3.2	Gross expenditure on R&D, % GDP	2.1	14	◆
2.3.3	Global R&D companies, top 3, mn US$	90.1	6	◆
2.3.4	QS university ranking, average score top 3*	82.3	5	◆
	Infrastructure	**56.8**	**29**	◆
3.1	Information & communication technologies (ICTs)	66.7	45	
3.1.1	ICT access*	55.8	75	
3.1.2	ICT use*	52.7	63	
3.1.3	Government's online service*	76.8	31	◆
3.1.4	E-participation*	81.4	22	◆
3.2	General infrastructure	68.0	3	● ◆
3.2.1	Electricity output, kWh/cap	4,262.0	50	
3.2.2	Logistics performance*	73.9	26	◆
3.2.3	Gross capital formation, % GDP	44.0	4	● ◆
3.3	Ecological sustainability	35.9	71	
3.3.1	GDP/unit of energy use	6.1	94	○ ◇
3.3.2	Environmental performance*	50.7	96	◇
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	6.4	15	
	Market sophistication	**55.6**	**25**	◆
4.1	Credit	42.8	48	
4.1.1	Ease of getting credit*	60.0	61	
4.1.2	Domestic credit to private sector, % GDP	156.7	7	◆
4.1.3	Microfinance gross loans, % GDP	0.0	70	○
4.2	Investment	36.3	84	
4.2.1	Ease of protecting minority investors*	48.3	97	○
4.2.2	Market capitalization, % GDP	65.6	25	
4.2.3	Venture capital deals/bn PPP$ GDP	0.1	22	
4.3	Trade, competition, & market scale	87.8	2	● ◆
4.3.1	Applied tariff rate, weighted mean, %	3.5	72	
4.3.2	Intensity of local competition†	74.4	30	◆
4.3.3	Domestic market scale, bn PPP$	23,122.0	1	● ◆

		Score/Value	Rank	
	Business sophistication	**56.0**	**9**	◆
5.1	Knowledge workers	85.6	1	● ◆
5.1.1	Knowledge-intensive employment, %	n/a	n/a	
5.1.2	Firms offering formal training, % firms[d]	79.2	1	● ◆
5.1.3	GERD performed by business, % GDP	1.6	12	◆
5.1.4	GERD financed by business, %	76.1	2	● ◆
5.1.5	Females employed w/advanced degrees, %	n/a	n/a	
5.2	Innovation linkages	30.7	58	
5.2.1	University/industry research collaboration†	56.5	27	◆
5.2.2	State of cluster development†	59.6	26	◆
5.2.3	GERD financed by abroad, %	0.7	94	○
5.2.4	JV–strategic alliance deals/bn PPP$ GDP	0.1	28	◆
5.2.5	Patent families 2+ offices/bn PPP$ GDP	0.8	29	◆
5.3	Knowledge absorption	51.7	12	◆
5.3.1	Intellectual property payments, % total trade	1.2	26	
5.3.2	High-tech net imports, % total trade	24.3	3	● ◆
5.3.3	ICT services imports, % total trade	0.6	90	
5.3.4	FDI net inflows, % GDP	2.1	77	
5.3.5	Research talent, % in business enterprise	61.9	9	◆
	Knowledge & technology outputs	**56.5**	**5**	◆
6.1	Knowledge creation	69.1	4	● ◆
6.1.1	Patents by origin/bn PPP$ GDP	56.6	1	● ◆
6.1.2	PCT patents by origin/bn PPP$ GDP	2.1	18	◆
6.1.3	Utility models by origin/bn PPP$ GDP	69.0	1	● ◆
6.1.4	Scientific & technical articles/bn PPP$ GDP	11.7	42	
6.1.5	Citable documents H index	52.7	14	◆
6.2	Knowledge impact	63.5	2	● ◆
6.2.1	Growth rate of PPP$ GDP/worker, %	6.5	3	● ◆
6.2.2	New businesses/th pop. 15–64	n/a	n/a	
6.2.3	Computer software spending, % GDP	0.4	23	◆
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	16.5	22	
6.2.5	High- & medium-high-tech manufactures, %	0.5	12	◆
6.3	Knowledge diffusion	37.0	22	◆
6.3.1	Intellectual property receipts, % total trade	0.1	66	
6.3.2	High-tech net exports, % total trade	28.7	1	● ◆
6.3.3	ICT services exports, % total trade	1.2	78	
6.3.4	FDI net outflows, % GDP	1.6	41	
	Creative outputs	**45.4**	**21**	◆
7.1	Intangible assets	71.9	1	● ◆
7.1.1	Trademarks by origin/bn PPP$ GDP	165.7	3	● ◆
7.1.2	Industrial designs by origin/bn PPP$ GDP	29.7	1	● ◆
7.1.3	ICTs & business model creation†	61.7	55	
7.1.4	ICTs & organizational model creation†	59.7	43	◆
7.2	Creative goods & services	35.1	28	◆
7.2.1	Cultural & creative services exports, % total trade[d]	0.0	67	○
7.2.2	National feature films/mn pop. 15–69	0.6	88	○
7.2.3	Entertainment & Media market/th pop. 15–69	6.4	41	
7.2.4	Printing & other media, % manufacturing	0.8	74	○
7.2.5	Creative goods exports, % total trade	12.5	1	● ◆
7.3	Online creativity	2.8	84	
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	2.5	69	
7.3.2	Country-code TLDs/th pop. 15–69	5.6	46	
7.3.3	Wikipedia edits/mn pop. 15–69	0.3	111	○ ◇
7.3.4	Mobile app creation/bn PPP$ GDP	n/a	n/a	

NOTES: ● indicates a strength; ○ a weakness; ◆ an income group strength; ◇ an income group weakness; * an index; † a survey question.
[d] indicates that the country'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; see page 75 of this appendix for details.