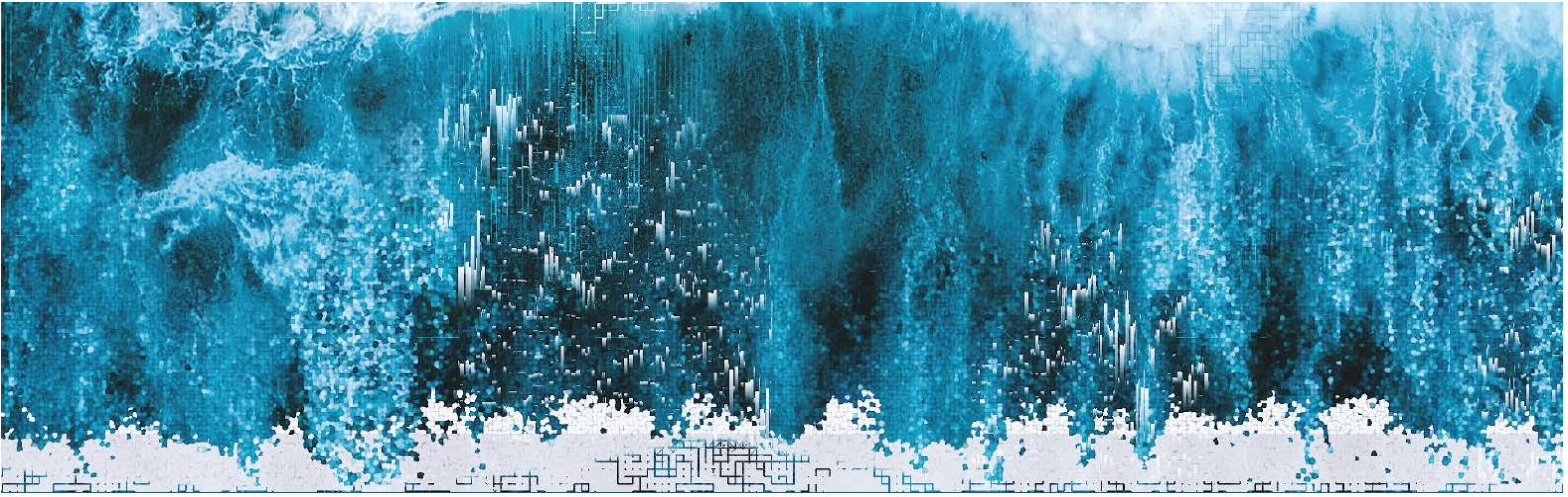


GLOBAL INNOVATION INDEX 2018

Japan

13th Japan is ranked 13th in the GII 2018, moving up 1 position from the previous year.

Japan continues to be among the 15 most innovative countries in the world. One of the largest world R&D spenders, and home to many innovative firms, Japan also boasts the most innovative cluster in the world, Tokyo–Yokohama, which tops the overall innovation cluster ranking for the second consecutive year.

This year, Japan is also the world first economy in terms of quality of innovation inputs and outputs. It gains ground in the quality of its universities with a higher overall score for its three best universities: University of Tokyo, Kyoto University, and Tokyo Institute of Technology. The country also shows improvement in the quality of its publications and earns the top score in patent families among high-income economies.

This year it improves the most in variables related to institutions, market sophistication, and creativity. In particular, it improves in its credit market, but also in trademarks, and earns a good rank in the newly introduced indicator, mobile app creation. Japan ranks 1st in a number of input and output indicators, including R&D financed by business, patent families in two or more offices, patents by origin, PCT patent applications, and IP receipts (for a complete list of Japan's comparative strengths, see pages 3 and 4 of this brief).

For all the factors mentioned above, Japan 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 Japan's ranking over time in the overall GII, the Innovation Input and Output Sub-Indices – which summarize Japan'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]

Japan's ranking over time

	GII	Input	Output	Efficiency
2018	13	12	18	44
2017	14	11	20	49
2016	16	9	24	65

- Over the last three years, Japan has improved its ranking in innovation outputs, reaching the 18th position this year, up from the 20th in 2017 and the 24th in 2016.
- Its position in innovation inputs, instead, deteriorates, ranking 12th this year, down from the 11th position in 2017 and the 9th in 2016.
- Over the past three years, Japan has become increasingly efficient in translating its innovation inputs into outputs. Its Innovation Efficiency Ratio ranks 44th this year, up from the 49th position last year and the 65th position in 2016. This ratio is positively influenced by improved rankings in innovation outputs.

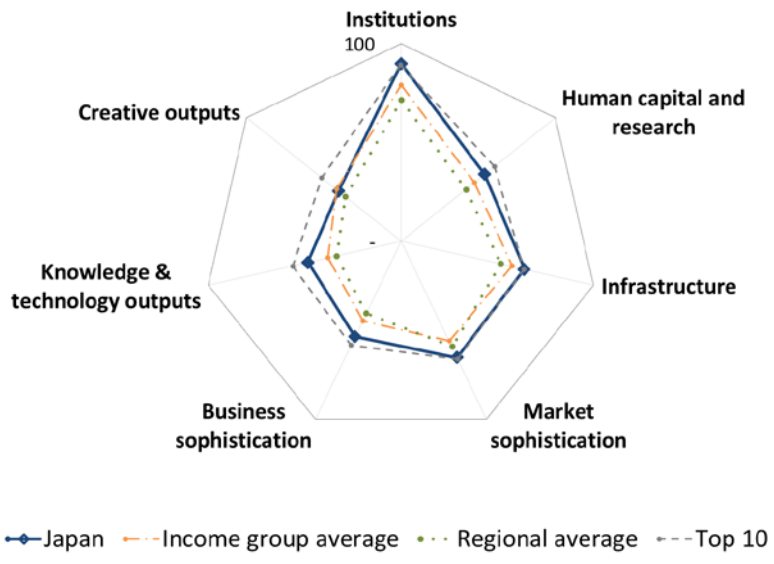
13th Japan is ranked 13th among the 47 high-income countries in the GII 2018.

3rd Japan is ranked 3rd among the 15 countries in South East Asia and Oceania.

[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 Japan to other high-income countries and the South East Asia and Oceania region

Japan's scores by area



High-income countries

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

Top scores in *Regulatory environment, Research and Development (R&D), Information and Communication Technologies (ICTs), Trade, competition & market scale, Knowledge workers,* and *Knowledge creation* are behind these high rankings.

South East Asia and Oceania region

Compared to other countries in the South East Asia and Oceania region, Japan performs above average in all GII areas.

Japan's innovation profile

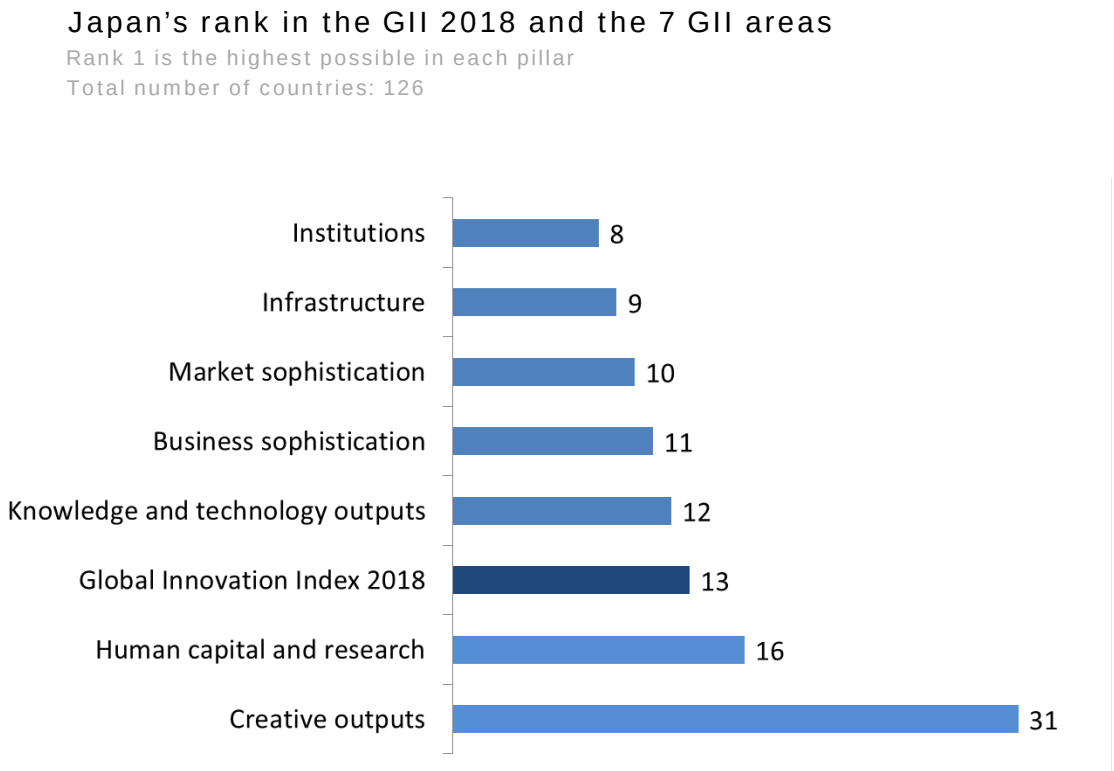
Strengths

- In **Institutions** (8th), Japan performs strongly in indicators *Cost of redundancy dismissal* and *Ease of resolving insolvency* – both ranking 1st globally.
- In **Human Capital and Research** (16th), Japan has strengths in indicators *PISA results* (3rd) and *Global R&D companies expenditures* (4th).
- In **Infrastructure** (9th), indicator *E-participation* (2nd) is a strength.
- In **Market Sophistication** (10th), it shows strengths in the area *Trade, competition & market scale* (3rd). At the variable level, strengths lie in *Domestic credit to private sector* (4th), *Intensity of local competition* (1st), and *Domestic market scale* (4th).
- In **Business Sophistication** (11th), Japan exhibits strengths in the indicators *R&D performed by business* (3rd), *R&D financed by business* (1st), *Patent families filed in two or more offices* (1st), and *Research talent in business enterprise* (3rd).
- On the **Innovation Output** side, Japan's strengths are concentrated in **Knowledge & Technology Outputs** (12th) where it shows strong performance in indicators *Patents by origin, PCT patents by origin,* and *Intellectual property receipts* – all ranking 1st in the world.

Weaknesses

- In **Institutions** (8th), Japan presents one relative weakness in the indicator *Ease of starting a business* (83rd).
- In **Human Capital and Research** (16th), Japan exhibits weakness in the indicator *Expenditure on education* (90th).
- In **Market Sophistication** (10th), Japan shows weak performance in indicators *Ease of getting credit* (70th) and *Venture capital deals* (66th).
- In **Business Sophistication** (11th), it has relative weaknesses in *R&D financed by abroad* (93rd) and *FDI inflows* (117th).
- On the **Innovation Output** side, three out of the four relative weaknesses for Japan are found in **Knowledge and Technology Outputs** (12th), in particular in indicators *Productivity growth* (79th), *New businesses* (95th), and *ICT services exports* (99th).
- In **Creative Outputs** (31st), Japan has relative weakness in one indicator: *Cultural & creative services exports* (52nd).

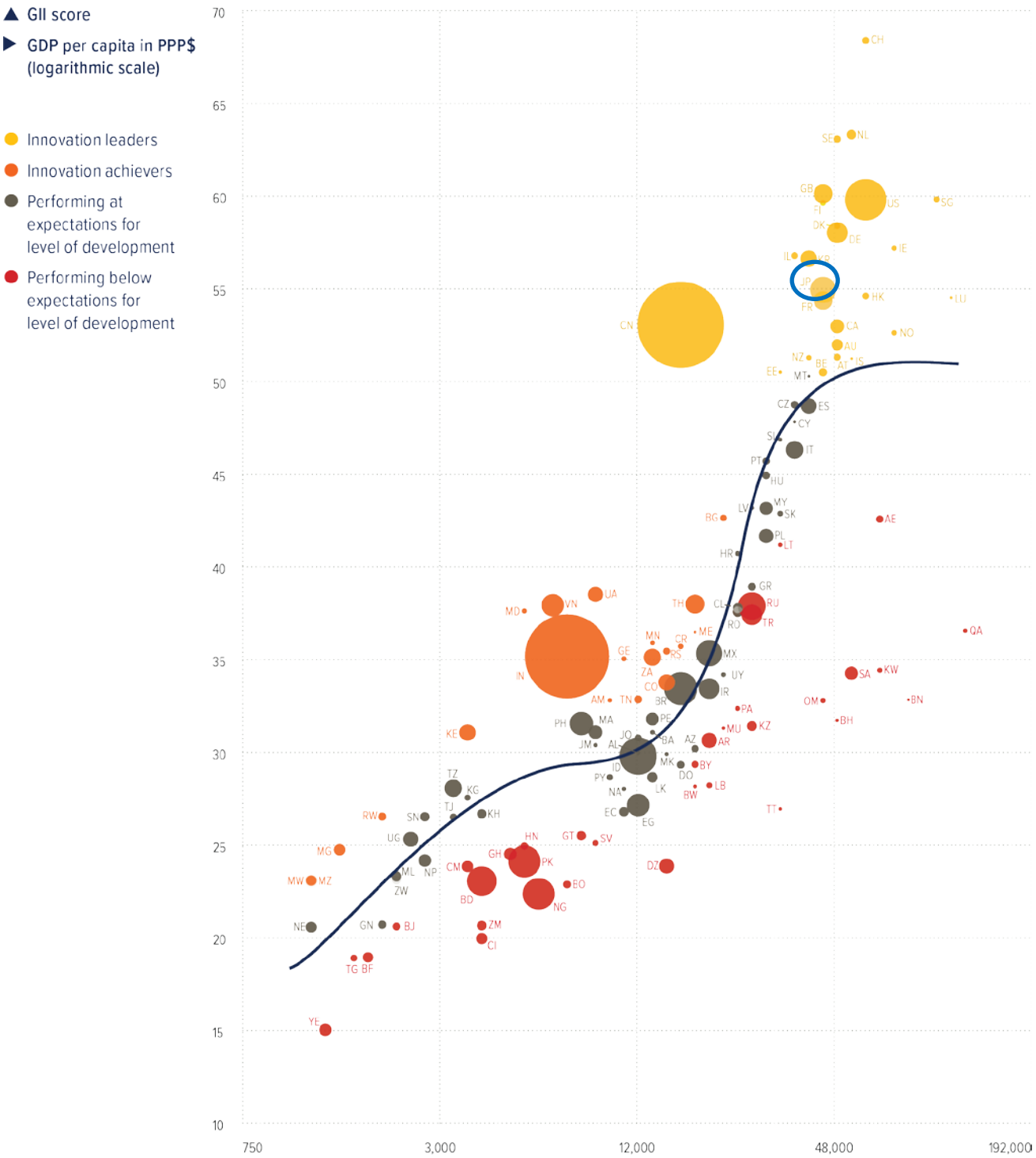
The following figure presents a summary of Japan's ranks in the 7 GII areas, as well as the overall rank in the GII 2018.



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, Japan 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 Japan that is not available or that is outdated.

Missing Data

Code	Indicator	Country Year	Model Year	Source
2.2.2	Graduates in science & engineering, %	n/a	2016	UNESCO Institute for Statistics
4.1.3	Microfinance gross loans, % GDP	n/a	2016	Microfinance Information Exchange, Mix Market
5.1.2	Firms offering formal training, % firms	n/a	2013	World Bank, Enterprise Surveys

Outdated Data

Code	Indicator	Country Year	Model Year	Source
2.1.3	School life expectancy, years	2015	2016	UNESCO Institute for Statistics
2.1.5	Pupil-teacher ratio, secondary	2015	2016	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	2015	2016	UNESCO Institute for Statistics
2.2.3	Tertiary inbound mobility, %	2015	2016	UNESCO Institute for Statistics
6.2.2	New businesses/th pop. 15–64	2014	2016	World Bank, Doing Business
6.2.5	High- & medium-high-tech manufactures, %	2014	2015	UNIDO, Industrial Statistics
7.2.4	Printing & other media, % manufacturing	2014	2015	UNIDO, Industrial Statistics

JAPAN

GII 2018 rank **13**

Output rank	Input rank	Income	Region	Efficiency ratio	Population (mn)	GDP, PPP$	GDP per capita, PPP$	GII 2017 rank
18	12	High	SEAO	44	127.5	5,405.1	42,831.5	14

		Score/Value	Rank	
	Institutions	**89.8**	**8**	
1.1	Political environment	89.8	7	
1.1.1	Political stability & safety*	88.0	14	
1.1.2	Government effectiveness*	90.7	9	
1.2	Regulatory environment	90.6	15	
1.2.1	Regulatory quality*	80.7	19	
1.2.2	Rule of law*	81.7	21	
1.2.3	Cost of redundancy dismissal, salary weeks	8.0	1	●
1.3	Business environment	88.9	7	
1.3.1	Ease of starting a business*	84.4	83	○ ◇
1.3.2	Ease of resolving insolvency*	93.4	1	● ◆
	Human capital & research	**54.3**	**16**	
2.1	Education	51.2	49	◇
2.1.1	Expenditure on education, % GDP	3.6	90	○ ◇
2.1.2	Government funding/pupil, secondary, % GDP/cap	23.9	29	
2.1.3	School life expectancy, years[d]	15.2	45	◇
2.1.4	PISA scales in reading, maths & science	528.9	3	● ◆
2.1.5	Pupil-teacher ratio, secondary[d]	11.4	40	
2.2	Tertiary education	34.4	53	
2.2.1	Tertiary enrolment, % gross[d]	63.2	35	
2.2.2	Graduates in science & engineering, %	n/a	n/a	
2.2.3	Tertiary inbound mobility, %[d]	3.4	58	◇
2.3	Research & development (R&D)	77.3	5	
2.3.1	Researchers, FTE/mn pop.	5,210.0	11	
2.3.2	Gross expenditure on R&D, % GDP	3.1	5	
2.3.3	Global R&D companies, top 3, mn US$	91.7	4	●
2.3.4	QS university ranking, average score top 3*	80.4	8	
	Infrastructure	**64.0**	**9**	
3.1	Information & communication technologies (ICTs)	88.9	5	
3.1.1	ICT access*	88.0	9	
3.1.2	ICT use*	81.5	11	
3.1.3	Government's online service*	87.7	15	
3.1.4	E-participation*	98.3	2	● ◆
3.2	General infrastructure	52.2	23	
3.2.1	Electricity output, kWh/cap	8,029.3	20	
3.2.2	Logistics performance*	88.2	12	
3.2.3	Gross capital formation, % GDP	23.4	55	
3.3	Ecological sustainability	50.8	23	
3.3.1	GDP/unit of energy use	10.6	43	
3.3.2	Environmental performance*	74.7	20	
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	5.2	20	
	Market sophistication	**65.3**	**10**	
4.1	Credit	68.0	11	
4.1.1	Ease of getting credit*	55.0	70	○
4.1.2	Domestic credit to private sector, % GDP	185.0	4	● ◆
4.1.3	Microfinance gross loans, % GDP	n/a	n/a	
4.2	Investment	40.7	63	◇
4.2.1	Ease of protecting minority investors*	58.3	61	
4.2.2	Market capitalization, % GDP	100.8	8	
4.2.3	Venture capital deals/bn PPP$ GDP	0.0	66	○ ◇
4.3	Trade, competition, & market scale	87.2	3	● ◆
4.3.1	Applied tariff rate, weighted mean, %	1.4	16	
4.3.2	Intensity of local competition†	86.8	1	● ◆
4.3.3	Domestic market scale, bn PPP$	5,405.1	4	● ◆

		Score/Value	Rank	
	Business sophistication	**53.8**	**11**	
5.1	Knowledge workers	62.3	20	
5.1.1	Knowledge-intensive employment, %	24.9	59	◇
5.1.2	Firms offering formal training, % firms	n/a	n/a	
5.1.3	GERD performed by business, % GDP	2.5	3	● ◆
5.1.4	GERD financed by business, %	78.1	1	● ◆
5.1.5	Females employed w/advanced degrees, %	21.0	22	
5.2	Innovation linkages	45.7	20	
5.2.1	University/industry research collaboration†	62.3	22	
5.2.2	State of cluster development†	69.1	10	
5.2.3	GERD financed by abroad, %	0.7	93	○
5.2.4	JV–strategic alliance deals/bn PPP$ GDP	0.0	40	◇
5.2.5	Patent families 2+ offices/bn PPP$ GDP	12.9	1	● ◆
5.3	Knowledge absorption	53.3	8	
5.3.1	Intellectual property payments, % total trade	2.5	9	
5.3.2	High-tech net imports, % total trade	14.8	13	
5.3.3	ICT services imports, % total trade	1.8	29	
5.3.4	FDI net inflows, % GDP	0.4	117	○
5.3.5	Research talent, % in business enterprise	73.4	3	● ◆
	Knowledge & technology outputs	**48.6**	**12**	
6.1	Knowledge creation	54.9	11	
6.1.1	Patents by origin/bn PPP$ GDP	49.7	1	● ◆
6.1.2	PCT patents by origin/bn PPP$ GDP	8.9	1	● ◆
6.1.3	Utility models by origin/bn PPP$ GDP	0.9	27	
6.1.4	Scientific & technical articles/bn PPP$ GDP	9.8	52	◇
6.1.5	Citable documents H index	71.0	6	
6.2	Knowledge impact	39.7	48	◇
6.2.1	Growth rate of PPP$ GDP/worker, %	0.0	79	○
6.2.2	New businesses/th pop. 15–64[d]	0.2	95	○ ◇
6.2.3	Computer software spending, % GDP	0.3	54	◇
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	9.4	33	
6.2.5	High- & medium-high-tech manufactures, %[d]	0.5	9	
6.3	Knowledge diffusion	51.1	11	
6.3.1	Intellectual property receipts, % total trade	5.0	1	● ◆
6.3.2	High-tech net exports, % total trade	12.6	14	
6.3.3	ICT services exports, % total trade	0.5	99	○
6.3.4	FDI net outflows, % GDP	3.1	21	◇
	Creative outputs	**40.4**	**31**	◇
7.1	Intangible assets	52.6	28	
7.1.1	Trademarks by origin/bn PPP$ GDP	74.6	23	
7.1.2	Industrial designs by origin/bn PPP$ GDP	4.7	26	
7.1.3	ICTs & business model creation†	72.0	28	◇
7.1.4	ICTs & organizational model creation†	65.2	27	◇
7.2	Creative goods & services	40.3	16	
7.2.1	Cultural & creative services exports, % total trade	0.1	52	○ ◇
7.2.2	National feature films/mn pop. 15–69	6.7	26	
7.2.3	Entertainment & Media market/th pop. 15–69	67.9	6	
7.2.4	Printing & other media, % manufacturing[d]	2.0	18	
7.2.5	Creative goods exports, % total trade	2.4	21	
7.3	Online creativity	16.1	45	◇
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	15.8	31	◇
7.3.2	Country-code TLDs/th pop. 15–69	5.0	49	◇
7.3.3	Wikipedia edits/mn pop. 15–69	18.6	50	◇
7.3.4	Mobile app creation/bn PPP$ GDP	31.1	29	

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;** * 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 pagepage 75 of this appendix for details.