

# Global Innovation Index 2022



## JAPAN

### 13th

Japan ranks 13th 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 Japan 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 Japan in the GII 2022 is between ranks 13 and 13.

### Rankings for Japan (2020–2022)

GIIYR	GII	Innovation inputs	Innovation outputs
2020	16	12	18
2021	13	11	14
2022	13	11	12

- Japan performs better in innovation inputs than innovation outputs in 2022.
- This year Japan ranks 11th in innovation inputs, the same as last year but higher than 2020.
- As for innovation outputs, Japan ranks 12th. This position is higher than both 2021 and 2020.

### 12th

Japan ranks 12th among the 48 high-income group economies.

### 4th

Japan ranks 4th among the 17 economies in South East Asia, East Asia, and Oceania.

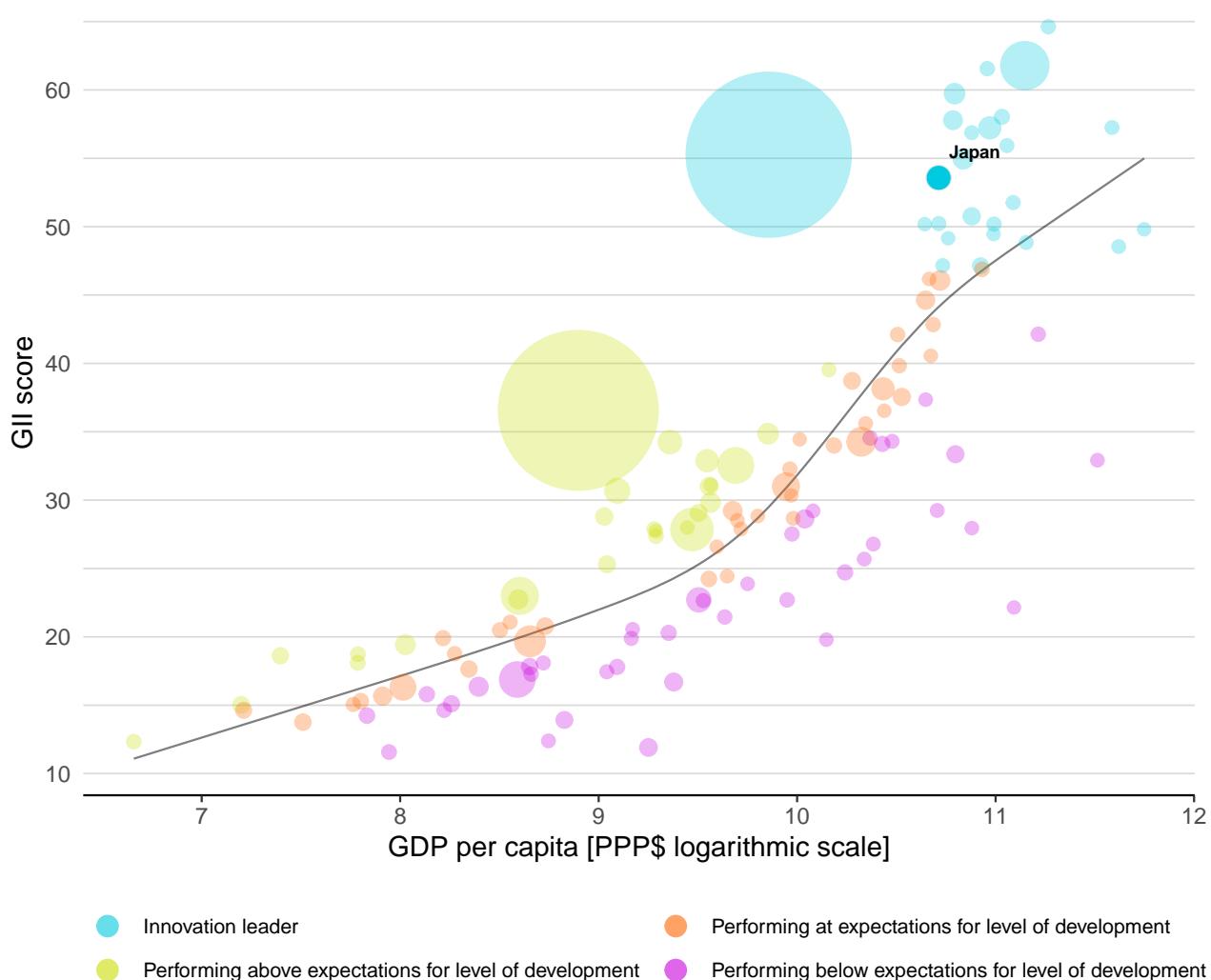


## EXPECTED VS. OBSERVED INNOVATION PERFORMANCE

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, Japan's performance is above expectations for its level of development.

### The positive relationship between innovation and development

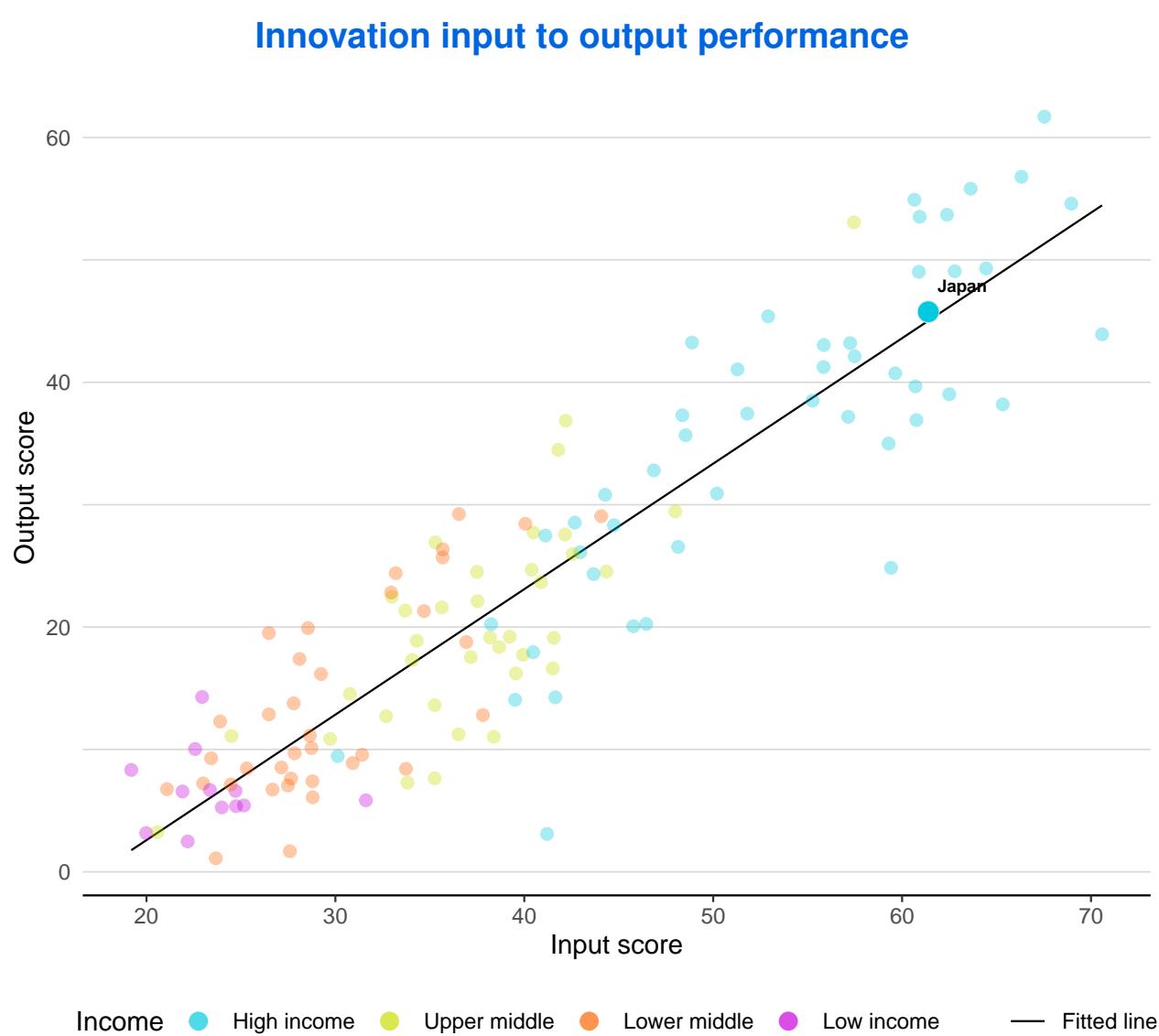




## EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

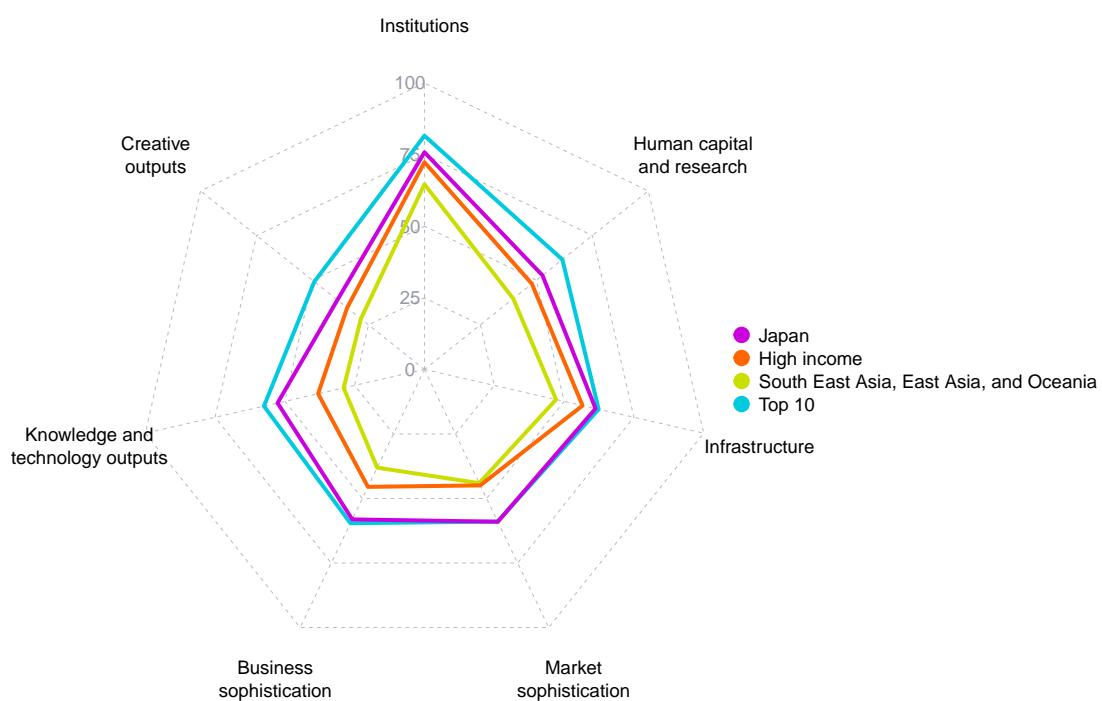
Japan produces more innovation outputs relative to its level of innovation investments.





## BENCHMARKING AGAINST OTHER HIGH-INCOME GROUP ECONOMIES AND SOUTH EAST ASIA, EAST ASIA, AND OCEANIA

### The seven GII pillar scores for Japan



### High-income group economies

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

### South East Asia, East Asia, and Oceania

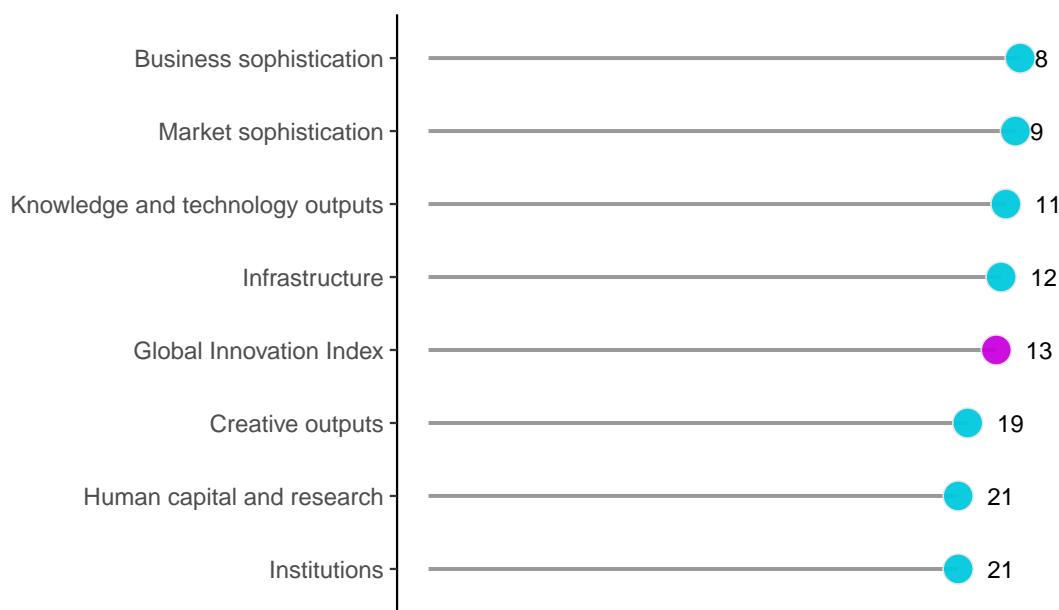
Japan performs above the regional average in all GII pillars.



## OVERVIEW OF RANKINGS IN THE SEVEN GII 2022 AREAS

Japan performs best in Business sophistication and its weakest performance is in Institutions and Human capital and research.

### The seven GII pillar ranks for Japan



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

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

[https://www.wipo.int/ipstats/en/statistics/country\\_profile/profile.jsp?code=JP](https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=JP).



## INNOVATION STRENGTHS AND WEAKNESSES

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

### Strengths and weaknesses for Japan

Strengths			Weaknesses		
Code	Indicator name	Rank	Code	Indicator name	Rank
1.2.3	Cost of redundancy dismissal	1	1.3.2	Entrepreneurship policies and culture	46
2.3.3	Global corporate R&D investors, top 3, mn USD	5	2.1.1	Expenditure on education, % GDP	107
3.1.4	E-participation	4	2.2.2	Graduates in science and engineering, %	68
3.2.2	Logistics performance	4	4.2.4	Venture capital received, value, % GDP	53
4.1.2	Domestic credit to private sector, % GDP	3	5.2.3	GERD financed by abroad, % GDP	66
4.3.3	Domestic market scale, bn PPP\$	1	5.3.4	FDI net inflows, % GDP	104
5.1.3	GERD performed by business, % GDP	4	6.2.1	Labor productivity growth, %	102
5.1.4	GERD financed by business, %	2	6.2.2	New businesses/th pop. 15–64	99
5.2.5	Patent families/bn PPP\$ GDP	1	6.3.4	ICT services exports, % total trade	80
5.3.5	Research talent, % in businesses	3	7.2.1	Cultural and creative services exports, % total trade	59
6.1.1	Patents by origin/bn PPP\$ GDP	1			
6.1.2	PCT patents by origin/bn PPP\$ GDP	1			
6.3.1	Intellectual property receipts, % total trade	3			
6.3.2	Production and export complexity	1			
7.2.3	Entertainment and media market/th pop. 15–69	3			

## Japan

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Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP\$ (bn)	GDP per capita, PPP\$	
12	11	High	SEAO	126.1	5,633.5	44,935	
				Score/ Value	Score/ Value	Score/ Value	
				Rank	Rank	Rank	
<b>Institutions</b>		75.8	21	<b>Business sophistication</b>		58.1	
1.1 Political environment	86.6	11	5.1 Knowledge workers	65.9	12		
1.1.1 Political and operational stability*	89.1	7	5.1.1 Knowledge-intensive employment, %	25.9	56	◇	
1.1.2 Government effectiveness*	84.1	13	5.1.2 Firms offering formal training, %	n/a	n/a		
1.2 Regulatory environment	91.1	9	5.1.3 GERD performed by business, % GDP	2.6	4	●	
1.2.1 Regulatory quality*	78.7	19	5.1.4 GERD financed by business, %	78.3	2	●◆	
1.2.2 Rule of law*	85.6	16	5.1.5 Females employed w/advanced degrees, %	22.9	24		
1.2.3 Cost of redundancy dismissal	8.0	1 ●	5.2 Innovation linkages	47.7	20		
1.3 Business environment	49.8	60 ◇	5.2.1 University-industry R&D collaboration <sup>†</sup>	59.1	25		
1.3.1 Policies for doing business <sup>†</sup>	65.1	27	5.2.2 State of cluster development and depth <sup>†</sup>	64.4	17		
1.3.2 Entrepreneurship policies and culture*	34.6	46 ○ ◇	5.2.3 GERD financed by abroad, % GDP	0.0	66 ○ ◇		
<b>Human capital and research</b>		52.7	21	5.2.4 Joint venture/strategic alliance deals/bn PPP\$ GDP	0.0	41 ◇	
2.1 Education	56.5	54 ◇	5.2.5 Patent families/bn PPP\$ GDP	13.6	1	●◆	
2.1.1 Expenditure on education, % GDP	3.1	107 ○ ◇	5.3 Knowledge absorption	60.7	5	●◆	
2.1.2 Government funding/pupil, secondary, % GDP/cap	23.6	30	5.3.1 Intellectual property payments, % total trade	2.9	8		
2.1.3 School life expectancy, years	n/a	n/a	5.3.2 High-tech imports, % total trade	15.0	16		
2.1.4 PISA scales in reading, maths and science	520.0	5	5.3.3 ICT services imports, % total trade	2.6	24		
2.1.5 Pupil-teacher ratio, secondary	10.8	36	5.3.4 FDI net inflows, % GDP	0.8	104 ○		
2.2 Tertiary education	24.2	83 ○ ◇	5.3.5 Research talent, % in businesses	74.7	3	●◆	
2.2.1 Tertiary enrolment, % gross	n/a	n/a	<b>Knowledge and technology outputs</b>		52.6	11	
2.2.2 Graduates in science and engineering, %	19.7	68 ○	6.1 Knowledge creation	62.1	10		
2.2.3 Tertiary inbound mobility, %	5.2	47	6.1.1 Patents by origin/bn PPP\$ GDP	42.8	1	●◆	
2.3 Research and development (R&D)	77.4	4 ●	6.1.2 PCT patents by origin/bn PPP\$ GDP	8.9	1	●◆	
2.3.1 Researchers, FTE/mn pop.	5,454.7	13	6.1.3 Utility models by origin/bn PPP\$ GDP	0.8	27		
2.3.2 Gross expenditure on R&D, % GDP	3.3	6	6.1.4 Scientific and technical articles/bn PPP\$ GDP	17.6	54	◇	
2.3.3 Global corporate R&D investors, top 3, mn USD	90.1	5 ●	6.1.5 Citable documents H-index	67.7	9		
2.3.4 QS university ranking, top 3*	80.7	8	6.2 Knowledge impact	30.5	55	◇	
<b>Infrastructure</b>		61.3	12	6.2.1 Labor productivity growth, %	-0.8	102 ○ ◇	
3.1 Information and communication technologies (ICTs)	90.2	14	6.2.2 New businesses/th pop. 15-64	0.4	99 ○ ◇		
3.1.1 ICT access*	92.1	29	6.2.3 Software spending, % GDP	0.2	52		
3.1.2 ICT use*	79.2	24	6.2.4 ISO 9001 quality certificates/bn PPP\$ GDP	6.2	45		
3.1.3 Government's online service*	90.6	12	6.2.5 High-tech manufacturing, %	55.2	9		
3.1.4 E-participation*	98.8	4 ●	6.3 Knowledge diffusion	65.2	5	●	
3.2 General infrastructure	55.9	14	6.3.1 Intellectual property receipts, % total trade	5.2	3	●◆	
3.2.1 Electricity output, GWh/mn pop.	8,140.8	17	6.3.2 Production and export complexity	100.0	1	●◆	
3.2.2 Logistics performance*	92.1	4 ●	6.3.3 High-tech exports, % total trade	13.1	11		
3.2.3 Gross capital formation, % GDP	25.5	51	6.3.4 ICT services exports, % total trade	1.2	80 ○		
3.3 Ecological sustainability	37.8	35	<b>Creative outputs</b>		38.9	19	
3.3.1 GDP/unit of energy use	12.9	40	7.1 Intangible assets	53.8	15		
3.3.2 Environmental performance*	57.2	25	7.1.1 Intangible asset intensity, top 15, %	70.8	21		
3.3.3 ISO 14001 environmental certificates/bn PPP\$ GDP	3.4	28	7.1.2 Trademarks by origin/bn PPP\$ GDP	64.6	36		
<b>Market sophistication</b>		59.0	9	7.1.3 Global brand value, top 5,000, % GDP	154.6	8	
4.1 Credit	59.6	7	7.1.4 Industrial designs by origin/bn PPP\$ GDP	4.2	29		
4.1.1 Finance for startups and scaleups*	45.4	26	7.2 Creative goods and services	36.7	13		
4.1.2 Domestic credit to private sector, % GDP	192.1	3 ●◆	7.2.1 Cultural and creative services exports, % total trade	0.4	59 ○		
4.1.3 Loans from microfinance institutions, % GDP	n/a	n/a	7.2.2 National feature films/mn pop. 15-69	8.2	8		
4.2 Investment	24.2	31	7.2.3 Entertainment and media market/th pop. 15-69	73.9	3	●	
4.2.1 Market capitalization, % GDP	119.4	10	7.2.4 Printing and other media, % manufacturing	1.6	21		
4.2.2 Venture capital investors, deals/bn PPP\$ GDP	0.1	27	7.2.5 Creative goods exports, % total trade	1.8	31		
4.2.3 Venture capital recipients, deals/bn PPP\$ GDP	0.1	25	7.3 Online creativity	11.4	41	◇	
4.2.4 Venture capital received, value, % GDP	0.0	53 ○ ◇	7.3.1 Generic top-level domains (TLDs)/th pop. 15-69	16.1	31	◇	
4.3 Trade, diversification, and market scale	93.2	4 ●◆	7.3.2 Country-code TLDs/th pop. 15-69	5.8	50	◇	
4.3.1 Applied tariff rate, weighted avg, %	2.2	64	7.3.3 GitHub commit pushes received/mn pop. 15-69	13.7	39	◇	
4.3.2 Domestic industry diversification	94.1	28	7.3.4 Mobile app creation/bn PPP\$ GDP	9.7	42		
4.3.3 Domestic market scale, bn PPP\$	5,633.5	1 ●◆					

NOTES: ● indicates a strength; ○ a weakness; ◆ an income group strength; ◇ an income group weakness; \* an index; <sup>†</sup> 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](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 Japan.

### Missing data for Japan

Code	Indicator name	Economy year	Model year	Source
2.1.3	School life expectancy, years	n/a	2019	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	n/a	2019	UNESCO Institute for Statistics
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 Japan

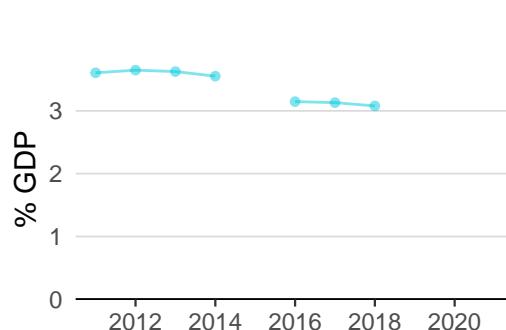
Code	Indicator name	Economy year	Model year	Source
2.1.1	Expenditure on education, % GDP	2018	2020	UNESCO Institute for Statistics
2.2.2	Graduates in science and engineering, %	2019	2020	UNESCO Institute for Statistics
4.3.2	Domestic industry diversification	2017	2019	United Nations Industrial Development Organization
5.1.1	Knowledge-intensive employment, %	2020	2021	International Labour Organization
5.1.5	Females employed w/advanced degrees, %	2020	2021	International Labour Organization
6.2.5	High-tech manufacturing, %	2017	2019	United Nations Industrial Development Organization
7.2.4	Printing and other media, % manufacturing	2017	2019	United Nations Industrial Development Organization



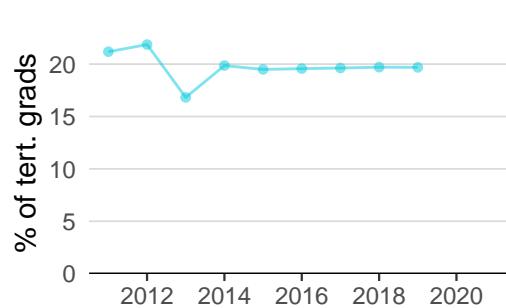
## JAPAN'S INNOVATION SYSTEM

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

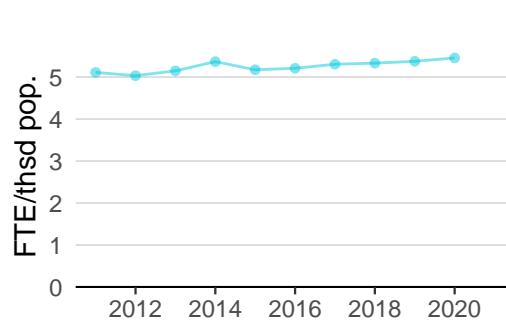
### Innovation inputs



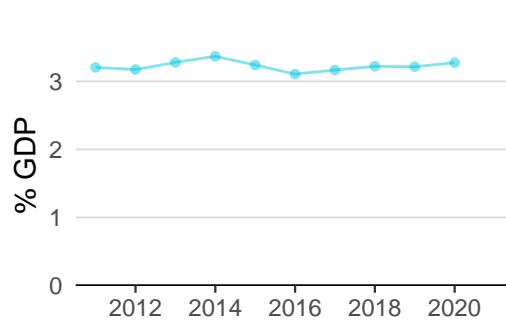
**2.1.1 Expenditure on education** was equal to 3.1% GDP in 2018—down by 2 percentage points from the year prior—and equivalent to an indicator rank of 107.



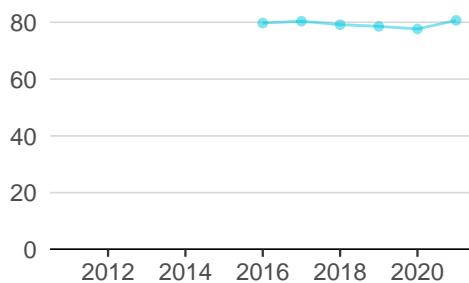
**2.2.2 Graduates in science and engineering** was equal to 19.7% of tert. grads in 2019—effectively unchanged from the year prior—and equivalent to an indicator rank of 68.



**2.3.1 Researchers** was equal to 5.5 FTE/thsd pop. in 2020—up by 1 percentage point from the year prior—and equivalent to an indicator rank of 13.



**2.3.2 Gross expenditure on R&D** was equal to 3.3% GDP in 2020—up by 2 percentage points from the year prior—and equivalent to an indicator rank of 6.



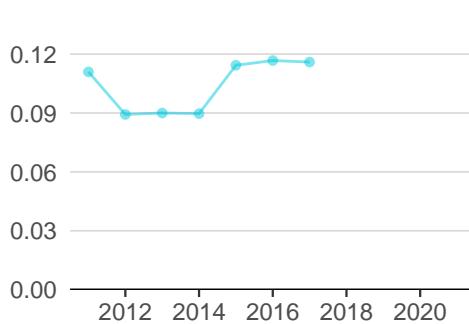
**2.3.4 QS university ranking** was equal to 80.7 in 2021—up by 4 percentage points from the year prior—and equivalent to an indicator rank of 8.



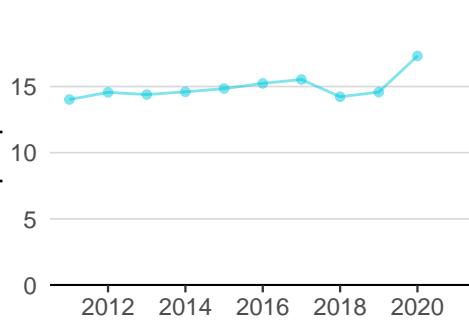
**3.1.1 ICT access** was equal to 9.2 in 2020 and equivalent to an indicator rank of 29.



**4.2.4 Venture capital received** was equal to 5.7 bn USD in 2021—up by 155 percentage points from the year prior—and equivalent to an indicator rank of 53.



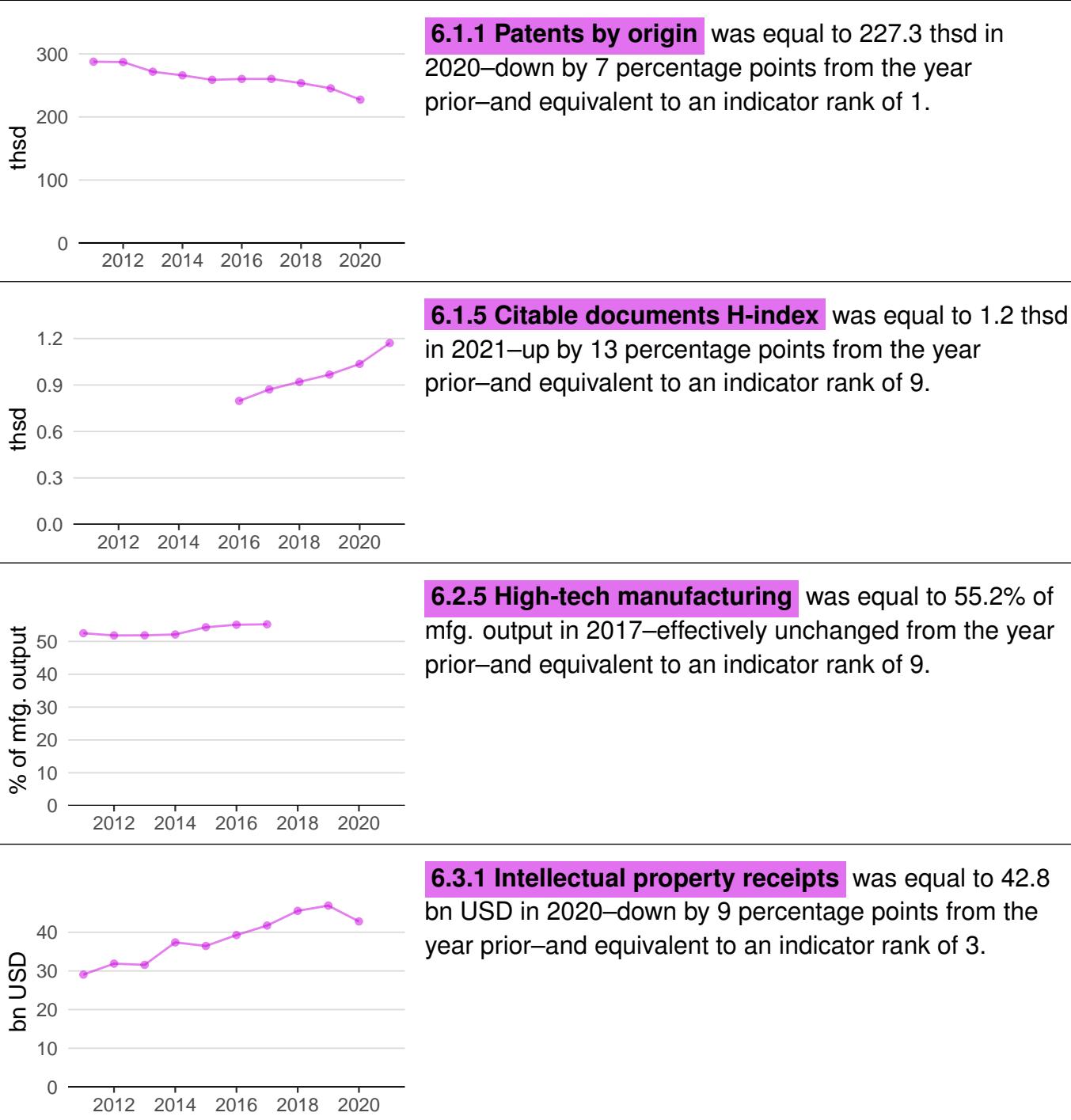
**4.3.2 Domestic industry diversification** was equal to 0.1 in 2017—down by 1 percentage point from the year prior—and equivalent to an indicator rank of 28.

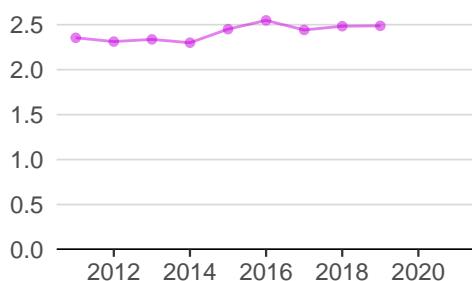


**5.1.1 Knowledge-intensive employment** was equal to 17.3 mn people in 2020—up by 19 percentage points from the year prior—and equivalent to an indicator rank of 56.



## Innovation outputs





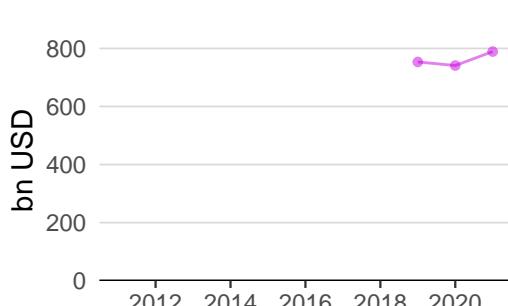
**6.3.2 Production and export complexity** was equal to 2.5 in 2019—effectively unchanged from the year prior—and equivalent to an indicator rank of 1.



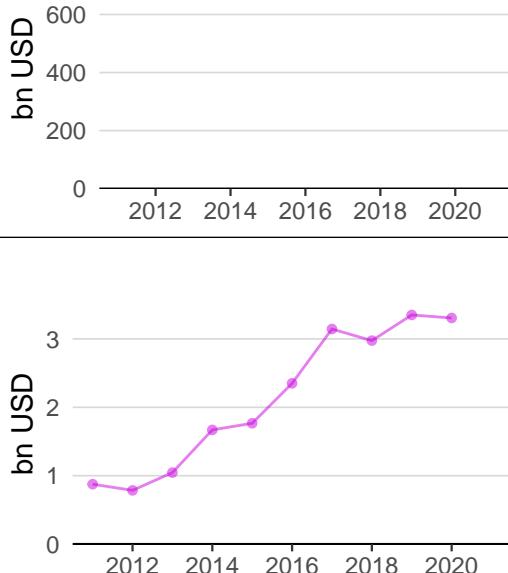
**6.3.3 High-tech exports** was equal to 102.8 bn USD in 2020—down by 1 percentage point from the year prior—and equivalent to an indicator rank of 11.



**7.1.1 Intangible asset intensity** was equal to 70.8% of total value in 2021 and equivalent to an indicator rank of 21.



**7.1.3 Global brand value** was equal to 789.2 bn USD in 2021—up by 6 percentage points from the year prior—and equivalent to an indicator rank of 8.



**7.2.1 Cultural and creative services exports** was equal to 3.3 bn USD in 2020—down by 1 percentage point from the year prior—and equivalent to an indicator rank of 59.



## JAPAN'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]	[%]	[%]	
TOYOTA MOTOR	Automobiles & Parts	8,620	-1.3	4.0	11
HONDA MOTOR	Automobiles & Parts	6,225	-5.5	6.0	20
NTT	Fixed Line Telecommunications	5,567	214.8	5.9	23

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
THE UNIVERSITY OF TOKYO	86.2	23=
KYOTO UNIVERSITY	82.3	33
TOKYO INSTITUTE OF TECHNOLOGY	73.5	56

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
SOFTBANK GROUP	1
KEYENCE	2
TAKEDA PHARMACEUTICAL	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
TOYOTA	Automobiles	1
NTT GROUP	Telecoms	2
MITSUBISHI GROUP	Automobiles	3

Source: Brand Finance (<https://brandirectory.com>).

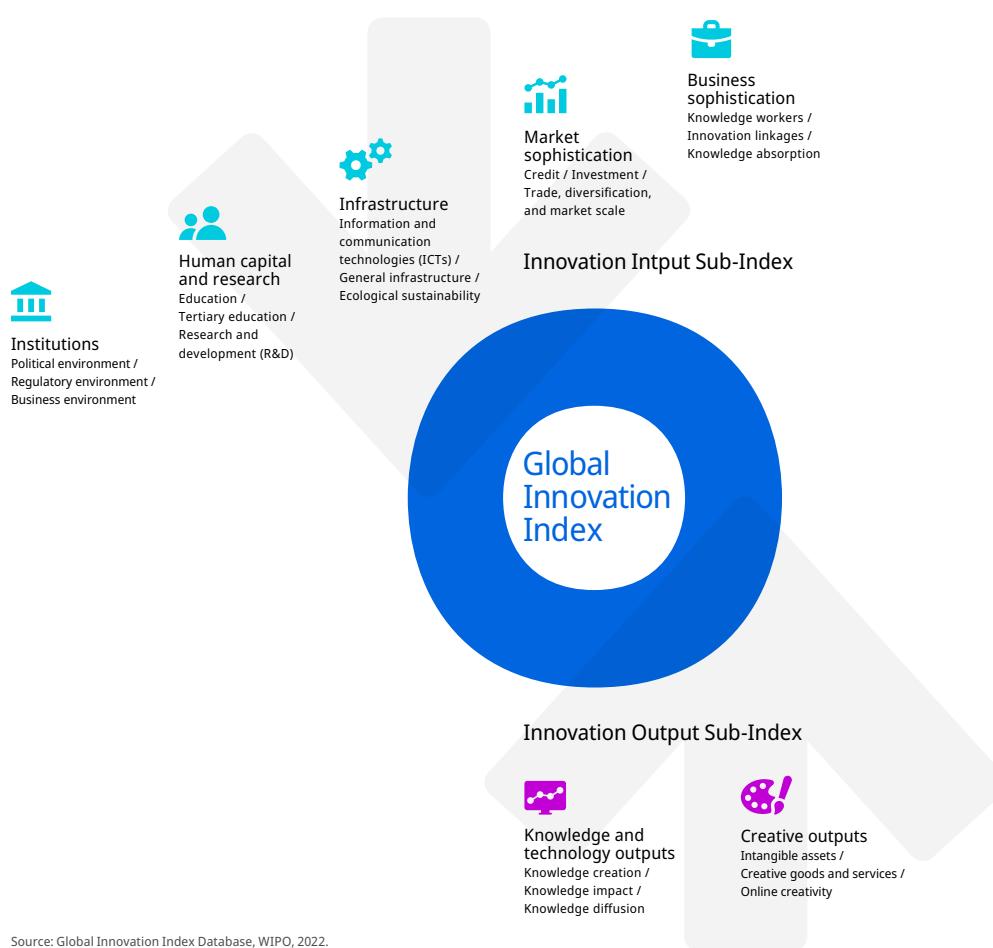
Note: Rank corresponds to within economy ranks.



## 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.



Source: Global Innovation Index Database, WIPO, 2022.

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.