Global Innovation Index 2022

CHINA

11th China ranks 11th 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 China 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 China in the GII 2022 is between ranks 8 and 12.

Rankings for China (2020–2022)

GIIYR	GII	Innovation inputs	Innovation outputs
2020	14	26	6
2021	12	25	7
2022	11	21	8

- China performs better in innovation outputs than innovation inputs in 2022.
- This year China ranks 21st in innovation inputs, higher than both 2021 and 2020.
- As for innovation outputs, China ranks 8th. This position is lower than both 2021 and 2020.

1st China ranks 1st among the 36 upper-middle-income group economies.

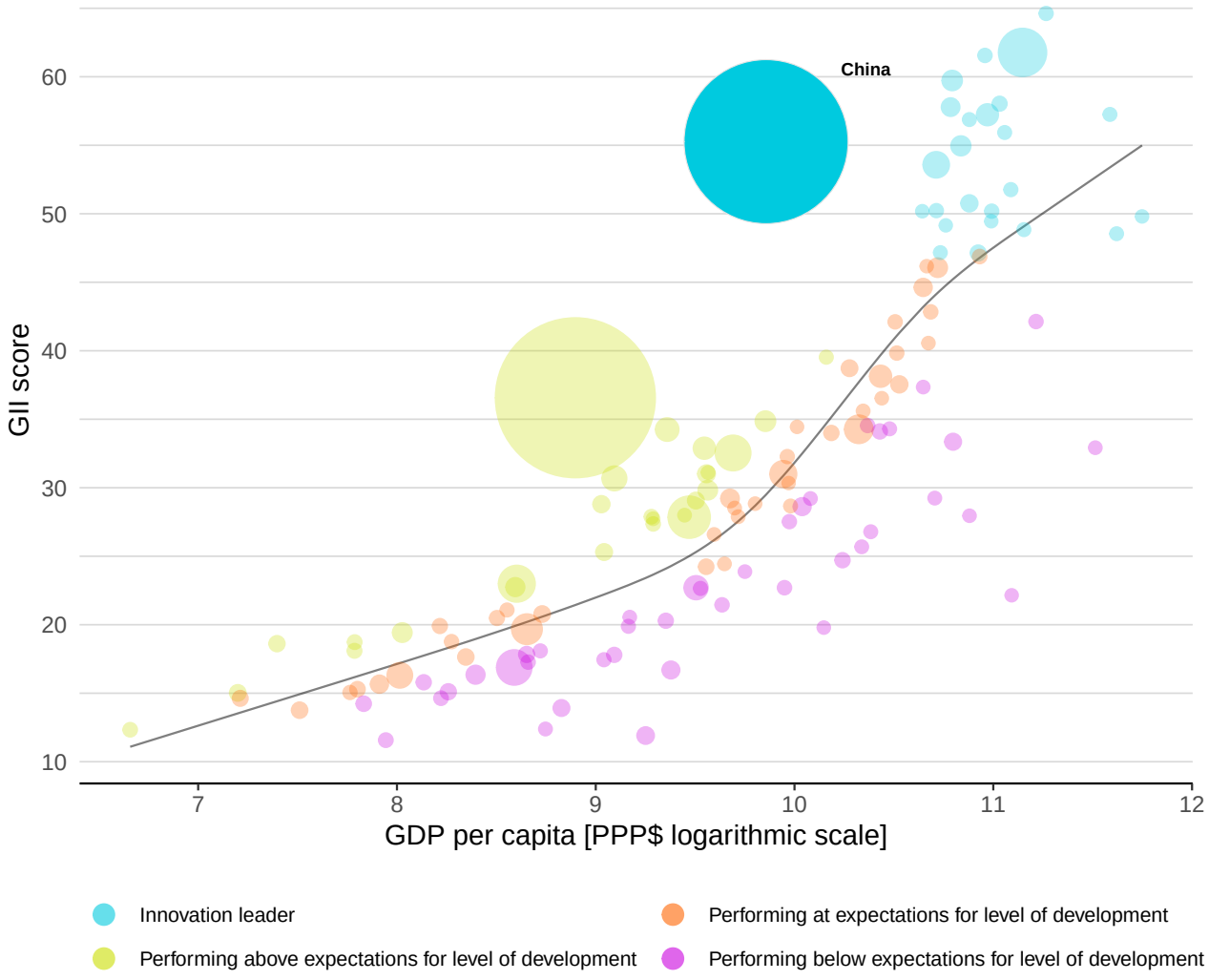
3rd China ranks 3rd among the 17 economies in South East Asia, East Asia, and Oceania.

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

The positive relationship between innovation and development

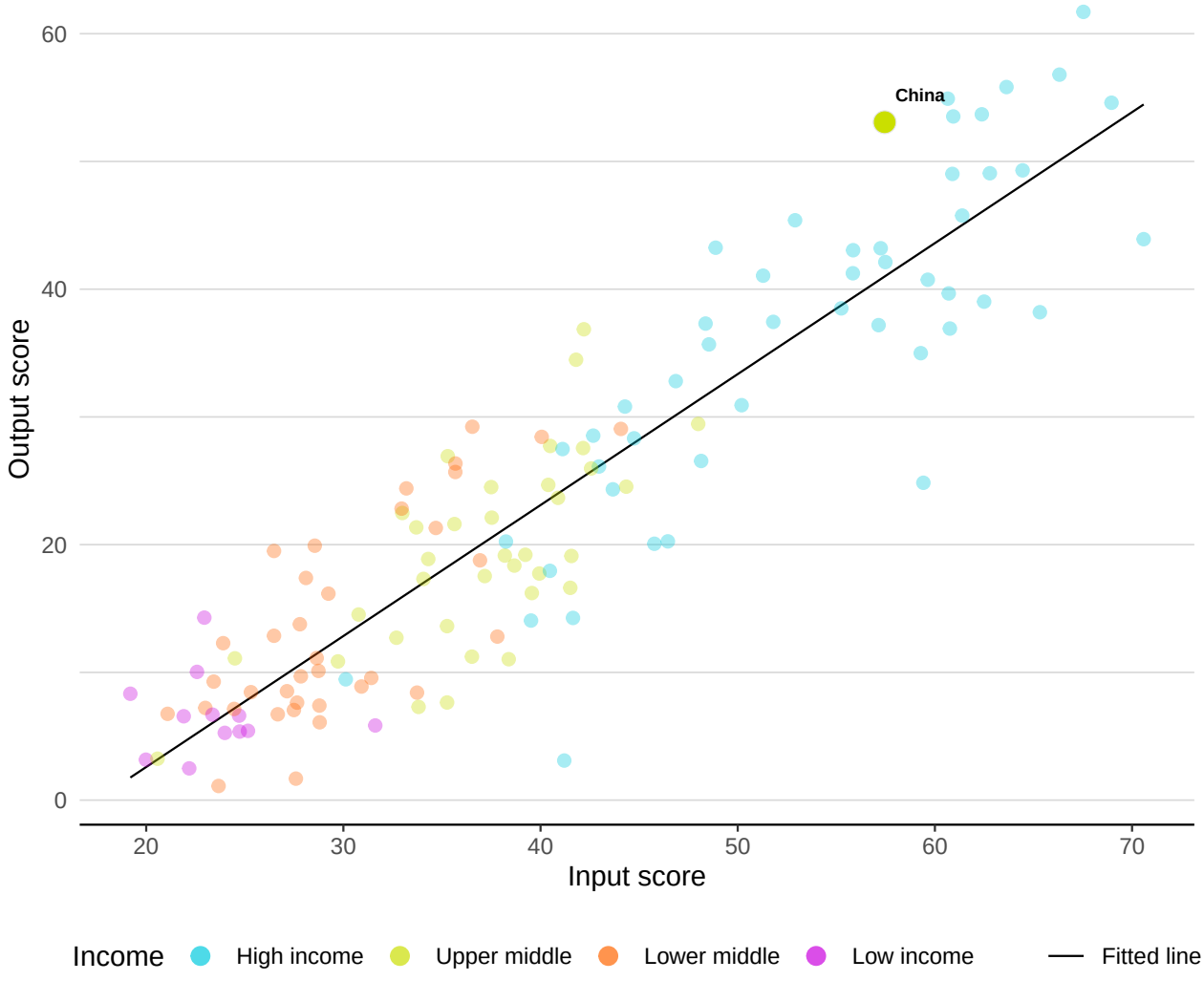


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

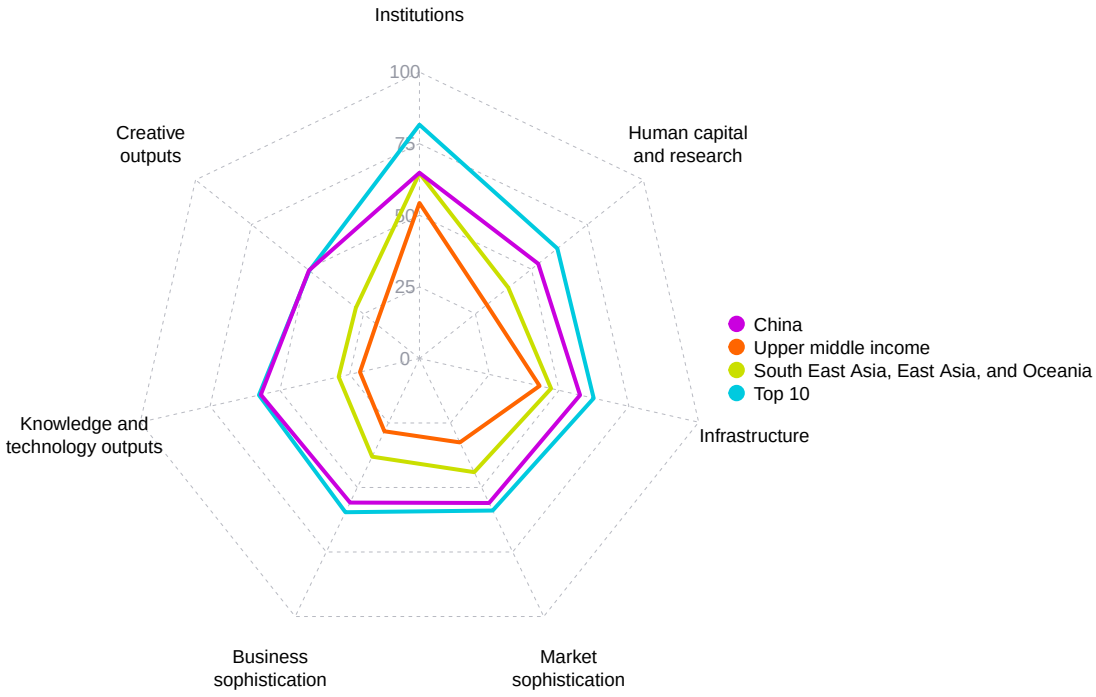
China produces more innovation outputs relative to its level of innovation investments.

Innovation input to output performance



BENCHMARKING AGAINST OTHER UPPER MIDDLE-INCOME GROUP ECONOMIES AND SOUTH EAST ASIA, EAST ASIA, AND OCEANIA

The seven GII pillar scores for China



Upper-middle-income group economies

China performs above the upper-middle-income group average in all GII pillars.

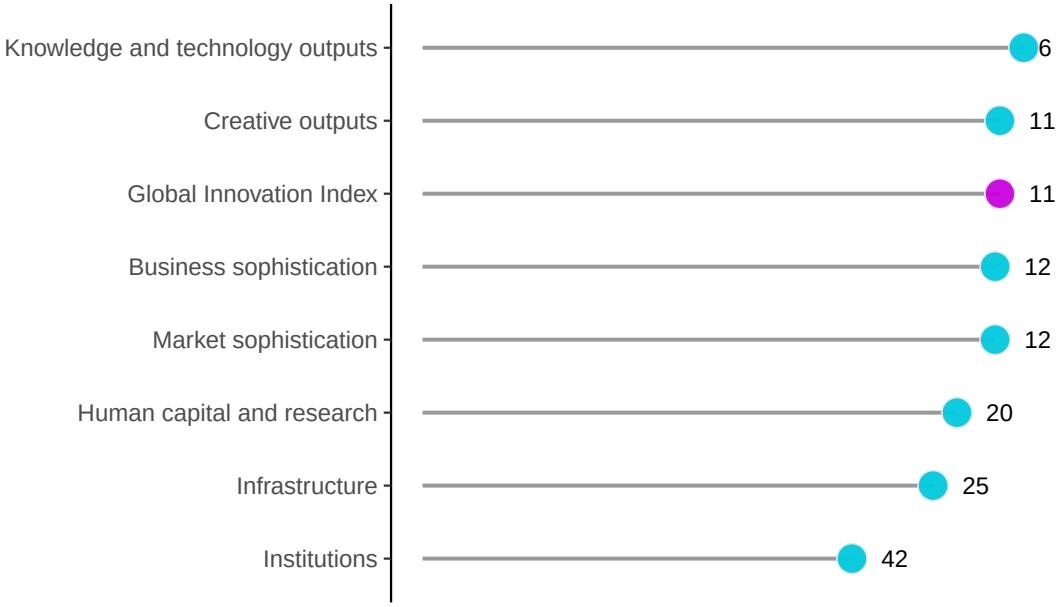
South East Asia, East Asia, and Oceania

China performs above the regional average in all GII pillars.

OVERVIEW OF RANKINGS IN THE SEVEN GII 2022 AREAS

China performs best in Knowledge and technology outputs and its weakest performance is in Institutions.

The seven GII pillar ranks for China



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

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

https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=CN.

INNOVATION STRENGTHS AND WEAKNESSES

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

Strengths and weaknesses for China

Strengths			Weaknesses		
Code	**Indicator name**	**Rank**	**Code**	**Indicator name**	**Rank**
2.1.4	PISA scales in reading, maths and science	1	1.2.3	Cost of redundancy dismissal	111
2.3.3	Global corporate R&D investors, top 3, mn USD	3	2.1.1	Expenditure on education, % GDP	95
2.3.4	QS university ranking, top 3	3	2.2.3	Tertiary inbound mobility, %	100
3.2.3	Gross capital formation, % GDP	3	3.3.1	GDP/unit of energy use	104
4.3.2	Domestic industry diversification	2	3.3.2	Environmental performance	115
4.3.3	Domestic market scale, bn PPP$	1	5.2.3	GERD financed by abroad, % GDP	77
5.1.2	Firms offering formal training, %	1	5.3.4	FDI net inflows, % GDP	86
5.1.4	GERD financed by business, %	3	7.2.2	National feature films/mn pop. 15–69	61
5.2.2	State of cluster development and depth	2	7.2.4	Printing and other media, % manufacturing	72
6.1.1	Patents by origin/bn PPP$ GDP	1	7.3.3	GitHub commit pushes received/mn pop. 15–69	89
6.1.3	Utility models by origin/bn PPP$ GDP	1			
6.2.1	Labor productivity growth, %	1			
7.1.2	Trademarks by origin/bn PPP$ GDP	1			
7.1.4	Industrial designs by origin/bn PPP$ GDP	1			
7.2.5	Creative goods exports, % total trade	1			

GII 2022 rank

China

11

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
8	21	Upper middle	SEAO	1,444.2	27,072.0	19,090

		Score/ Value	Rank	
Institutions		**64.8**	**42**	◆
1.1	**Political environment**	67.3	44	◆
1.1.1	Political and operational stability*	70.9	53	
1.1.2	Government effectiveness*	63.7	41	◆
1.2	**Regulatory environment**	52.7	101	○
1.2.1	Regulatory quality*	42.9	77	
1.2.2	Rule of law*	44.5	63	
1.2.3	Cost of redundancy dismissal	27.4	111	○ ◇
1.3	**Business environment**	74.6	13	◆
1.3.1	Policies for doing business†	71.9	16	◆
1.3.2	Entrepreneurship policies and culture* 🕘	77.3	9	◆
Human capital and research		**53.1**	**20**	◆
2.1	**Education**	69.3	[7]	
2.1.1	Expenditure on education, % GDP	3.6	95	○
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	n/a	
2.1.3	School life expectancy, years	n/a	n/a	
2.1.4	PISA scales in reading, maths and science	579.0	1	● ◆
2.1.5	Pupil-teacher ratio, secondary	13.4	61	
2.2	**Tertiary education**	19.4	92	○
2.2.1	Tertiary enrolment, % gross	58.4	52	
2.2.2	Graduates in science and engineering, %	n/a	n/a	
2.2.3	Tertiary inbound mobility, %	0.4	100	○ ◇
2.3	**Research and development (R&D)**	70.5	8	◆
2.3.1	Researchers, FTE/mn pop.	1,584.9	48	
2.3.2	Gross expenditure on R&D, % GDP	2.4	13	◆
2.3.3	Global corporate R&D investors, top 3, mn USD	93.8	3	● ◆
2.3.4	QS university ranking, top 3*	86.8	3	● ◆
Infrastructure		**57.5**	**25**	◆
3.1	**Information and communication technologies (ICTs)**	87.6	20	◆
3.1.1	ICT access*	88.1	61	
3.1.2	ICT use*	75.3	39	◆
3.1.3	Government's online service*	90.6	12	◆
3.1.4	E-participation*	96.4	9	◆
3.2	**General infrastructure**	56.0	13	◆
3.2.1	Electricity output, GWh/mn pop.	5,537.7	35	◆
3.2.2	Logistics performance*	72.6	25	◆
3.2.3	Gross capital formation, % GDP	42.9	3	● ◆
3.3	**Ecological sustainability**	29.0	54	
3.3.1	GDP/unit of energy use	6.8	104	○ ◇
3.3.2	Environmental performance*	28.4	115	○ ◇
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	7.0	15	
Market sophistication		**56.0**	**12**	◆
4.1	**Credit**	44.7	25	◆
4.1.1	Finance for startups and scaleups* 🕘	51.5	9	◆
4.1.2	Domestic credit to private sector, % GDP	182.4	4	◆
4.1.3	Loans from microfinance institutions, % GDP	0.9	29	
4.2	**Investment**	28.7	26	◆
4.2.1	Market capitalization, % GDP	62.7	29	
4.2.2	Venture capital investors, deals/bn PPP$ GDP	0.1	31	
4.2.3	Venture capital recipients, deals/bn PPP$ GDP	0.1	19	◆
4.2.4	Venture capital received, value, % GDP	0.0	16	◆
4.3	**Trade, diversification, and market scale**	94.6	3	● ◆
4.3.1	Applied tariff rate, weighted avg., %	2.5	67	
4.3.2	Domestic industry diversification 🕘	99.9	2	●
4.3.3	Domestic market scale, bn PPP$	27,072.0	1	● ◆

		Score/ Value	Rank	
Business sophistication		**55.9**	**12**	◆
5.1	**Knowledge workers**	77.8	[1]	
5.1.1	Knowledge-intensive employment, %	n/a	n/a	
5.1.2	Firms offering formal training, % 🕘	79.2	1	● ◆
5.1.3	GERD performed by business, % GDP	1.8	12	◆
5.1.4	GERD financed by business, %	77.5	3	● ◆
5.1.5	Females employed w/advanced degrees, %	n/a	n/a	
5.2	**Innovation linkages**	36.8	30	◆
5.2.1	University-industry R&D collaboration†	70.1	5	◆
5.2.2	State of cluster development and depth†	72.6	2	● ◆
5.2.3	GERD financed by abroad, % GDP	0.0	77	○
5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP	0.0	67	
5.2.5	Patent families/bn PPP$ GDP	1.5	23	◆
5.3	**Knowledge absorption**	53.0	8	◆
5.3.1	Intellectual property payments, % total trade	1.4	25	
5.3.2	High-tech imports, % total trade	26.9	5	◆
5.3.3	ICT services imports, % total trade	1.4	68	
5.3.4	FDI net inflows, % GDP	1.5	86	○
5.3.5	Research talent, % in businesses	58.5	15	◆
Knowledge and technology outputs		**56.8**	**6**	◆
6.1	**Knowledge creation**	69.5	4	◆
6.1.1	Patents by origin/bn PPP$ GDP	55.6	1	● ◆
6.1.2	PCT patents by origin/bn PPP$ GDP	2.6	14	◆
6.1.3	Utility models by origin/bn PPP$ GDP	120.7	1	● ◆
6.1.4	Scientific and technical articles/bn PPP$ GDP	23.1	39	◆
6.1.5	Citable documents H-index	64.1	11	◆
6.2	**Knowledge impact**	52.8	4	◆
6.2.1	Labor productivity growth, %	6.4	1	● ◆
6.2.2	New businesses/th pop. 15–64	8.6	17	◆
6.2.3	Software spending, % GDP	0.3	32	◆
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	13.4	23	
6.2.5	High-tech manufacturing, % 🕘	48.5	14	◆
6.3	**Knowledge diffusion**	48.2	19	◆
6.3.1	Intellectual property receipts, % total trade	0.3	35	◆
6.3.2	Production and export complexity	73.2	16	◆
6.3.3	High-tech exports, % total trade	32.4	4	◆
6.3.4	ICT services exports, % total trade	2.5	53	
Creative outputs		**49.3**	**11**	◆
7.1	**Intangible assets**	82.9	2	● ◆
7.1.1	Intangible asset intensity, top 15, %	78.4	11	◆
7.1.2	Trademarks by origin/bn PPP$ GDP	376.9	1	● ◆
7.1.3	Global brand value, top 5,000, % GDP	111.4	18	◆
7.1.4	Industrial designs by origin/bn PPP$ GDP	31.1	1	● ◆
7.2	**Creative goods and services**	28.8	33	◆
7.2.1	Cultural and creative services exports, % total trade	0.6	47	
7.2.2	National feature films/mn pop. 15–69	1.0	61	○
7.2.3	Entertainment and media market/th pop. 15–69	10.5	34	◆
7.2.4	Printing and other media, % manufacturing 🕘	0.7	72	○
7.2.5	Creative goods exports, % total trade	13.1	1	● ◆
7.3	**Online creativity**	2.8	77	
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	2.5	72	
7.3.2	Country-code TLDs/th pop. 15–69	4.0	58	
7.3.3	GitHub commit pushes received/mn pop. 15–69	1.7	89	○
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. 🕘 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. 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 China.

Missing data for China

Code	Indicator name	Economy year	Model year	Source
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	2018	UNESCO Institute for Statistics
2.1.3	School life expectancy, years	n/a	2019	UNESCO Institute for Statistics
2.2.2	Graduates in science and engineering, %	n/a	2020	UNESCO Institute for Statistics
5.1.1	Knowledge-intensive employment, %	n/a	2021	International Labour Organization
5.1.5	Females employed w/advanced degrees, %	n/a	2021	International Labour Organization
7.3.4	Mobile app creation/bn PPP$ GDP	n/a	2021	data.ia

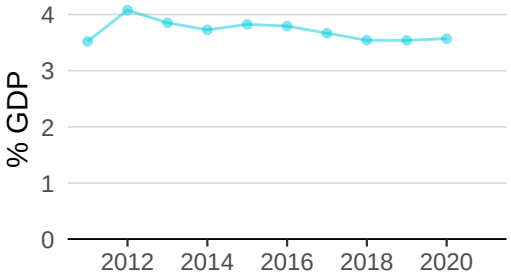
Outdated data for China

Code	Indicator name	Economy year	Model year	Source
1.3.2	Entrepreneurship policies and culture	2019	2021	Global Entrepreneurship Monitor
4.1.1	Finance for startups and scaleups	2019	2021	Global Entrepreneurship Monitor
4.3.2	Domestic industry diversification	2018	2019	United Nations Industrial Development Organization
5.1.2	Firms offering formal training, %	2012	2019	World Bank Enterprise Surveys
6.2.5	High-tech manufacturing, %	2018	2019	United Nations Industrial Development Organization
7.2.4	Printing and other media, % manufacturing	2018	2019	United Nations Industrial Development Organization

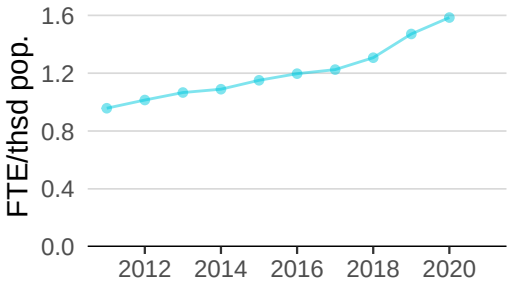
CHINA'S INNOVATION SYSTEM

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

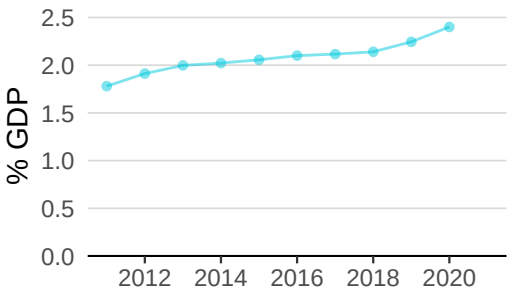
Innovation inputs



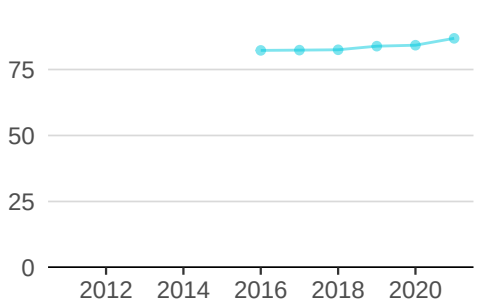
2.1.1 Expenditure on education was equal to 3.6% GDP in 2020–up by 1 percentage point from the year prior–and equivalent to an indicator rank of 95.



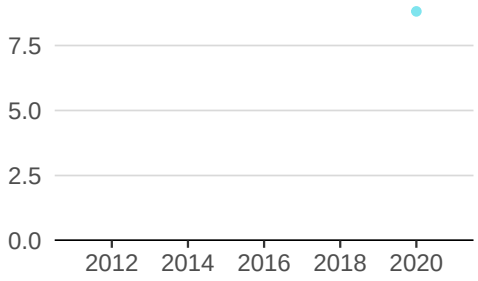
2.3.1 Researchers was equal to 1.6 FTE/thsd pop. in 2020–up by 8 percentage points from the year prior–and equivalent to an indicator rank of 48.



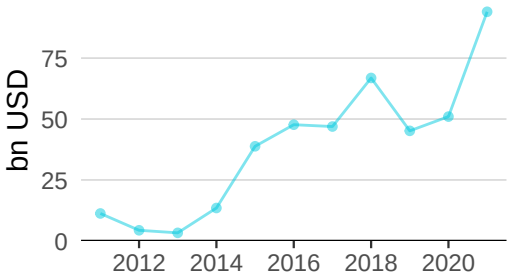
2.3.2 Gross expenditure on R&D was equal to 2.4% GDP in 2020–up by 7 percentage points from the year prior–and equivalent to an indicator rank of 13.



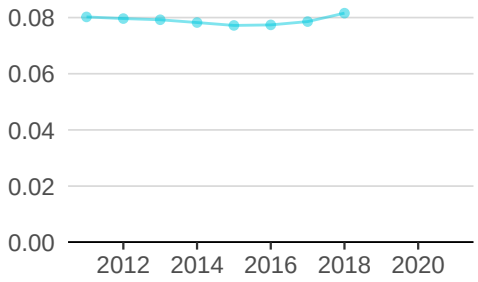
2.3.4 QS university ranking was equal to 86.8 in 2021–up by 3 percentage points from the year prior–and equivalent to an indicator rank of 3.



3.1.1 ICT access was equal to 8.8 in 2020 and equivalent to an indicator rank of 61.

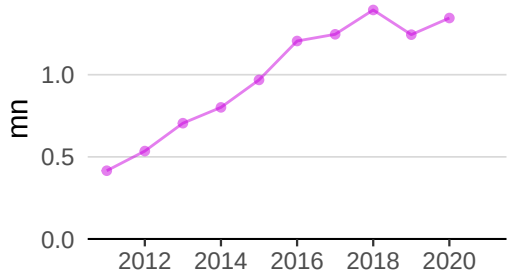


4.2.4 Venture capital received was equal to 94.0 bn USD in 2021–up by 84 percentage points from the year prior–and equivalent to an indicator rank of 16.

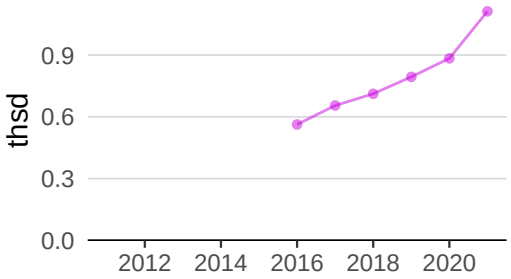


4.3.2 Domestic industry diversification was equal to 0.1 in 2018–up by 4 percentage points from the year prior–and equivalent to an indicator rank of 2.

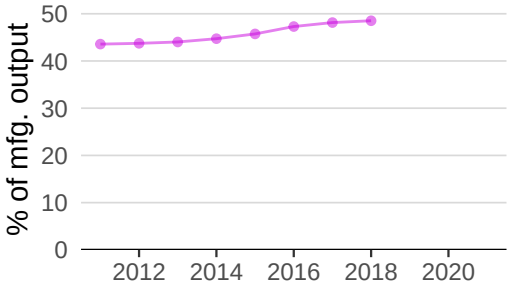
Innovation outputs



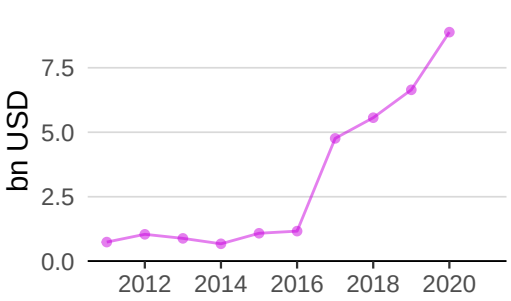
6.1.1 Patents by origin was equal to 1.3 mn in 2020–up by 8 percentage points from the year prior–and equivalent to an indicator rank of 1.



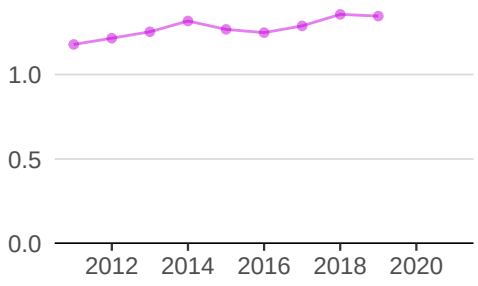
6.1.5 Citable documents H-index was equal to 1.1 thsd in 2021–up by 26 percentage points from the year prior–and equivalent to an indicator rank of 11.



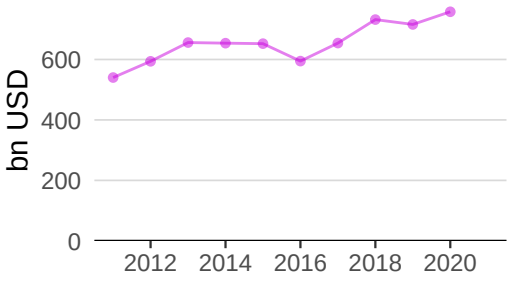
6.2.5 High-tech manufacturing was equal to 48.5% of mfg. output in 2018–up by 1 percentage point from the year prior–and equivalent to an indicator rank of 14.



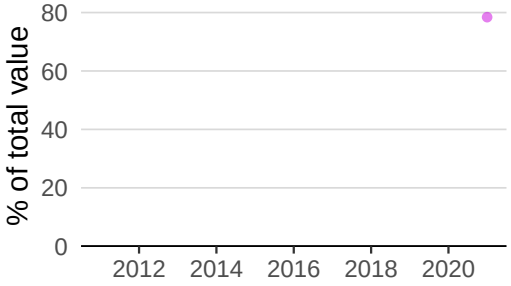
6.3.1 Intellectual property receipts was equal to 8.9 bn USD in 2020–up by 34 percentage points from the year prior–and equivalent to an indicator rank of 35.



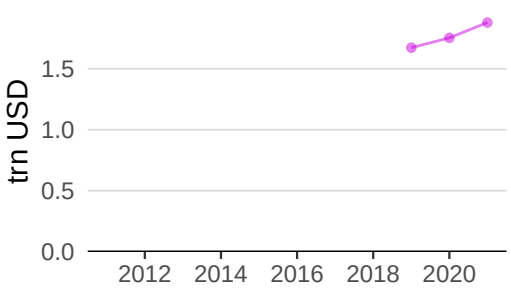
6.3.2 Production and export complexity was equal to 1.3 in 2019–down by 1 percentage point from the year prior–and equivalent to an indicator rank of 16.



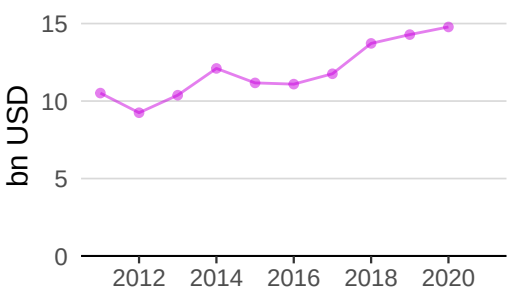
6.3.3 High-tech exports was equal to 757.7 bn USD in 2020–up by 6 percentage points from the year prior–and equivalent to an indicator rank of 4.



7.1.1 Intangible asset intensity was equal to 78.4% of total value in 2021 and equivalent to an indicator rank of 11.



7.1.3 Global brand value was equal to 1.9 trn USD in 2021–up by 7 percentage points from the year prior–and equivalent to an indicator rank of 18.



7.2.1 Cultural and creative services exports was equal to 14.8 bn USD in 2020–up by 3 percentage points from the year prior–and equivalent to an indicator rank of 47.

CHINA'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]	[%]	[%]	
HUAWEI INVESTMENT & HOLDING	Technology Hardware & Equipment	17,460	6.7	15.7	2
ALIBABA GROUP HOLDING	Software & Computer Services	7,138	32.9	8.0	17
TENCENT	Software & Computer Services	4,860	28.3	8.1	33

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
TSINGHUA UNIVERSITY	89.0	17
PEKING UNIVERSITY	88.8	18
FUDAN UNIVERSITY	82.6	31

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
TENCENT	1
TAIWAN SEMICONDUCTOR	2
ALIBABA GROUP	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

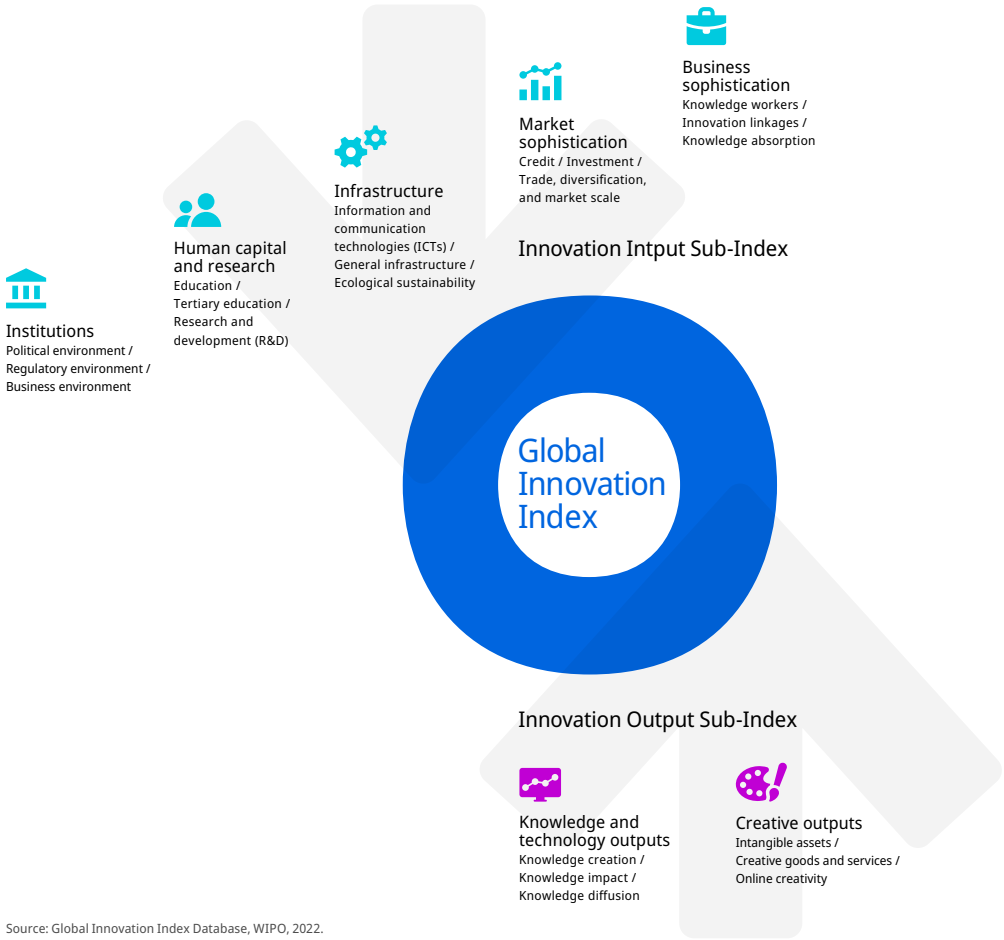
Brand	Industry	Rank
ICBC	Banking	1
HUAWEI	Tech	2
CHINA CONSTRUCTION BANK	Banking	3

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.