



# GLOBAL INNOVATION INDEX 2019

## CHINA

**14th**

China ranks 14th 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 China 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 China's ranking in the GII 2019 is between 12 and 17.

**China's Rankings, 2017 - 2019**

	GII	Innovation Inputs	Innovation Outputs
<b>2019</b>	14	26	5
<b>2018</b>	17	27	10
<b>2017</b>	22	31	11

- China performs better in Innovation Outputs than Inputs.
- This year China ranks 26th in Innovation Inputs, better than last year and compared to 2017.
- As for Innovation Outputs, China ranks 5th. This position is better than last year and compared to 2017.

**1st**

China ranks 1st among the 34 upper middle-income economies.

**4th**

China ranks 4th among the 15 economies in South East Asia, East Asia, and Oceania.

China continues its upward rise in the GII, moving to 14th (up from the 17th rank in 2018). It firmly establishes itself as one of the innovation leaders, contributing to 24% of the world's R&D expenditures in 2017 (up from only 2.6% in 1996) and to 44% of all patent applications (up from 2% in 1997).

China's improvement this year is largely due to its relative performance and less so to new GII data or methods (page 9).

This year China gains positions in four of the seven GII areas. Most notable gains are found in variables related to the quality of its institutions and to creativity, while indicators related to the quality of infrastructures and local markets also register improvements.

China is world leader in a number of important indicators, also relating to intellectual property and trade. These include Patents, Industrial designs, and Trademarks by origin, as well as High-technology exports and Creative goods' exports. It also takes the top rank in Labor productivity growth, while improving its ranking in indicators such as PCT patent applications and Information and communication (ICT) services' exports (pages 6 and 7).

China maintains its first place in quality of innovation among middle-income economies for the seventh consecutive year. Moreover, it is the only middle-income economy that is closing the gap with the high-income group in all three indicators capturing the quality of innovation. It ranks 3rd globally in the quality of universities. In quality of scientific publications, it stands above the high-income group average.

With 18 of the top 100 science and technology clusters of the world, China is the second economy after the United States of America in number of top science and technology clusters. Shenzhen – Hong Kong and Beijing are top ranked clusters, occupying the 2nd and 4th spots respectively. Almost all other Chinese clusters moved up the ranks this year.

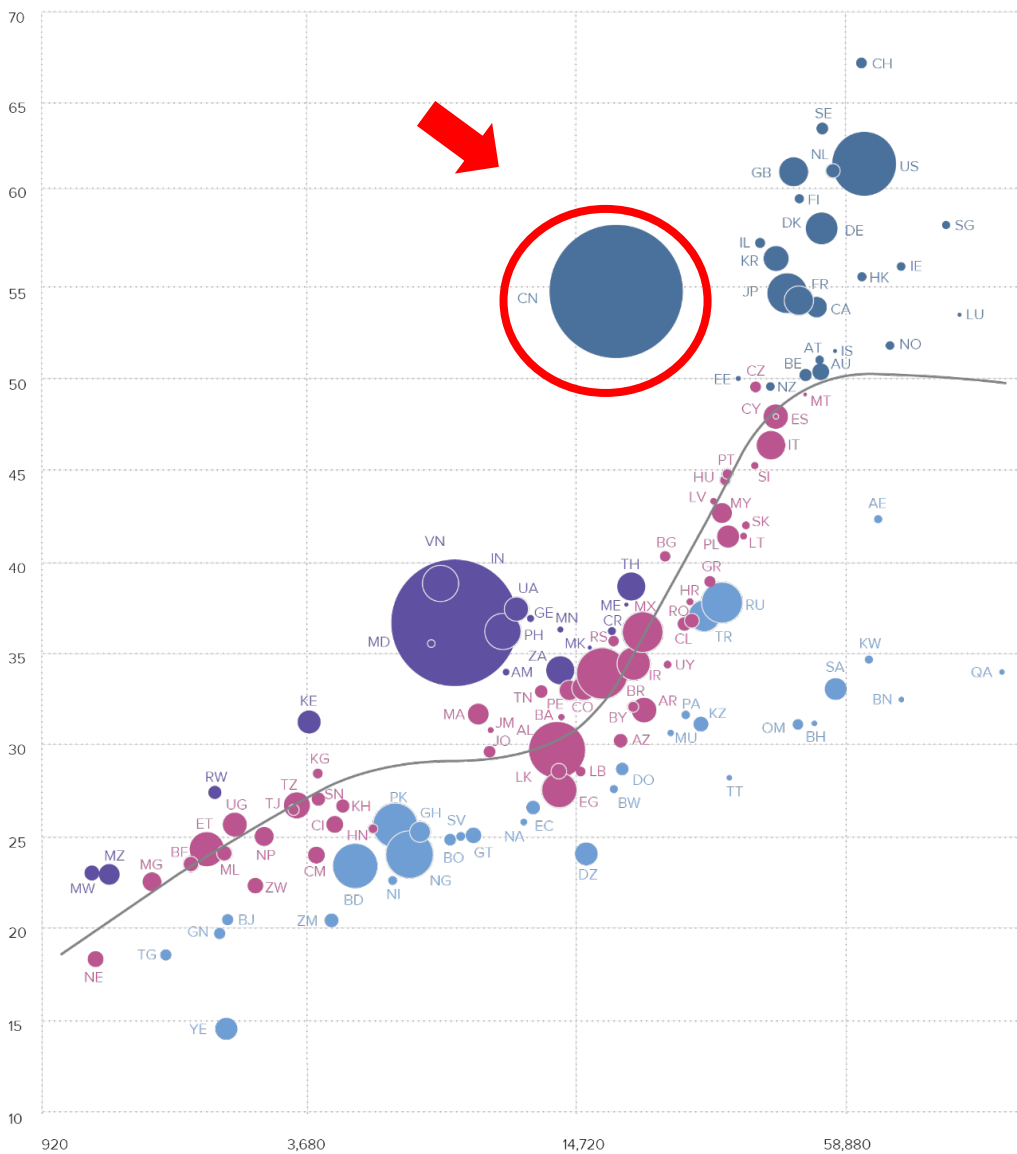
Despite these remarkable achievements, some areas of improvement still remain and include Tertiary inbound mobility, Environmental performance, FDI inflows, National feature films, Printing and other media, and Wikipedia edits (pages 6 and 7).

# 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, China performs well above its expected level of development.

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



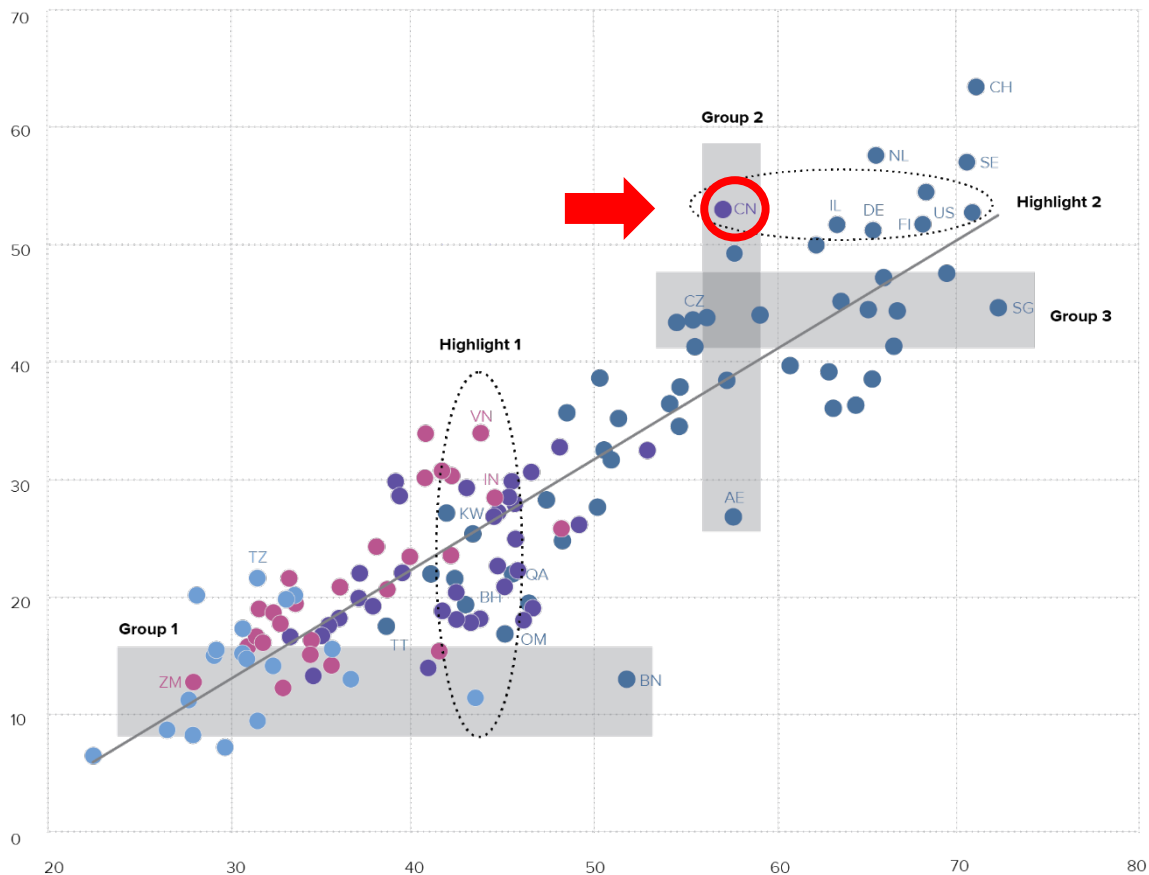
- ▲ GII score
- ▶ GDP per capita in PPP\$ (logarithmic scale)
- Innovation leaders
- Innovation achievers
- Performing at expectations for level of development
- Performing below expectations for level of development

# 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.

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

## Innovation input/output performance by income group, 2019

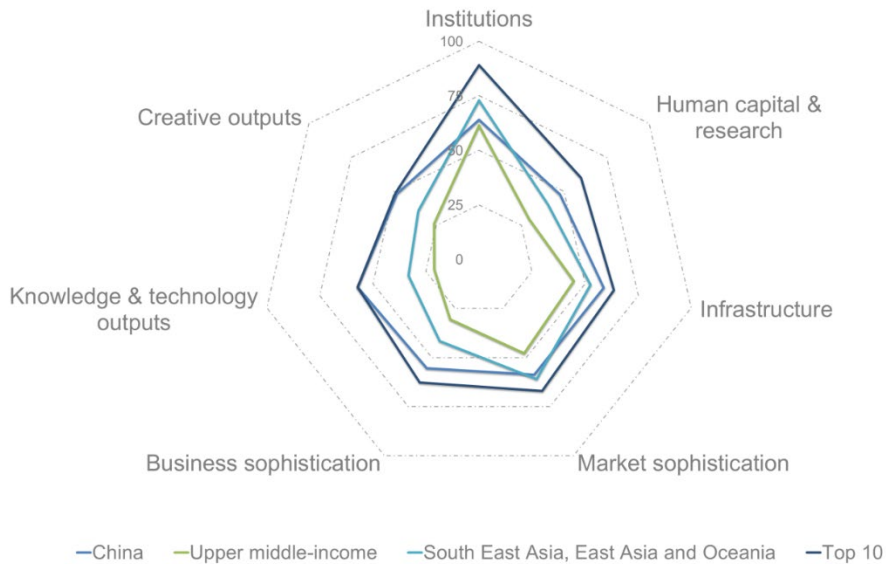


- ▲ Output score
- ▶ Input score
- High income
- Upper-middle income
- Lower-middle income
- Low income
- Fitted values

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 CHINA TO OTHER UPPER MIDDLE-INCOME ECONOMIES AND THE SOUTH EAST ASIA, EAST ASIA, AND OCEANIA REGION

## China's scores in the seven GII pillars



### Upper middle-income economies

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

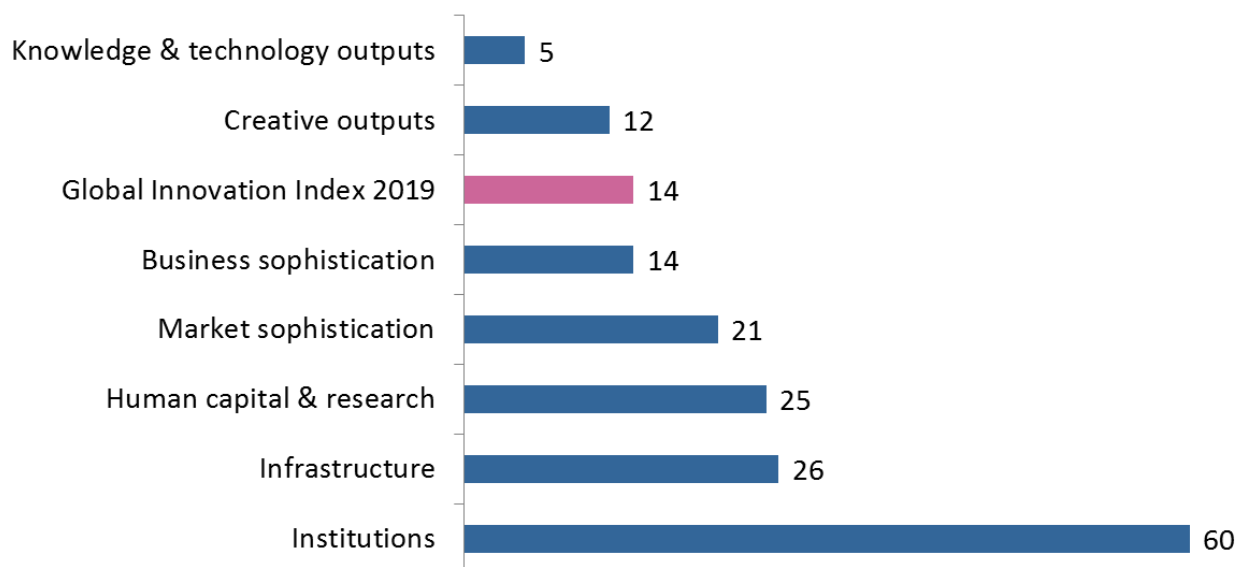
### South East Asia, East Asia, and Oceania Region

Compared to other economies in the South East Asia, East Asia, and Oceania region, China performs above average in 5 out of the 7 GII Pillars: Human capital & research, Infrastructure, Business sophistication, Knowledge & technology outputs, and Creative outputs.

Top ranks are found in areas such as General infrastructure, Trade, competition, & market scale, Knowledge workers, Knowledge creation, Knowledge impact, and Intangible assets where the country ranks in the top 5 worldwide.

## OVERVIEW OF CHINA'S RANKINGS IN THE 7 GII AREAS

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



\*The highest possible ranking in each pillar is 1.

## CHINA'S INNOVATION STRENGTHS AND WEAKNESSES

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

Strengths		
Code	Indicator name	Rank
2.3.4	QS university ranking, average score top 3*	3
3.2	General infrastructure	2
3.2.3	Gross capital formation, % GDP	4
4.3	Trade, competition, & market scale	2
4.3.3	Domestic market scale, bn PPP\$	1
5.1.2	Firms offering formal training, % firms	1
5.1.4	GERD financed by business, %	2
5.3.2	High-tech imports, % total trade	4
6.1	Knowledge creation	4
6.1.1	Patents by origin/bn PPP\$ GDP	1
6.1.3	Utility models by origin/bn PPP\$ GDP	1
6.2	Knowledge impact	1
6.2.1	Growth rate of PPP\$ GDP/worker, %, 3-year average	1
6.3.2	High-tech net exports, % total trade	1
7.1	Intangible assets	1
7.1.1	Trademarks by origin/bn PPP\$ GDP	1
7.1.2	Industrial designs by origin/bn PPP\$ GDP	1
7.2.5	Creative goods exports, % total trade	1

Weaknesses		
Code	Indicator name	Rank
1.2	Regulatory environment	100
1.2.3	Cost of redundancy dismissal, salary weeks	107
2.2	Tertiary education	94
2.2.3	Tertiary inbound mobility, %	101
3.3.1	GDP/unit of energy use	94
3.3.2	Environmental performance*	97
4.1.3	Microfinance gross loans, % GDP	69
5.2.3	GERD financed by abroad, %	93
5.3.4	FDI net inflows, % GDP, 3-year average	88
7.2.2	National feature films/mn pop. 15–69	87
7.2.4	Printing & other media, % manufacturing	79
7.3.3	Wikipedia edits/mn pop. 15–69	111

## STRENGTHS

- GII strengths for China are found in six of the seven GII pillars, and mostly on the innovation output side of the GII, which captures countries' innovation results.
- Several of these strengths are in Knowledge & technology outputs (5), the best ranked GII pillar for China. Here the country's strengths are sub-pillars Knowledge creation (4) and Knowledge impact (1) and indicators Patents by origin, Utility models by origin, Labor productivity growth, and High-tech exports. In all of these indicators, China is world leader this year.
- In Creative outputs (12), China's strengths are sub-pillar Intangible assets and indicators Trademarks by origin, Industrial designs by origin, and Creative goods exports. In all of these areas, China ranks first in the world.
- On the innovation input side, China's strengths are found in four areas.
- In Human capital & research (25), an important GII strength is indicator Quality of universities, where China places 3rd worldwide, after the United States of America and the United Kingdom.
- In Business sophistication (14), China's strength are indicators Firms offering formal training (1), R&D financed by business (2), and High-tech imports (4).
- In Market sophistication (21), relative strengths are sub-pillar Trade, competition, & market scale (2) and indicator Domestic market scale, where China positions 1st globally.
- In Infrastructure (26), China's strength is indicator Gross capital formation (4).

## WEAKNESSES

- China's weaknesses in the GII are found in all GII pillars, except for Knowledge & technology outputs (5).
- Most of these weaknesses are found on the innovation input side of the GII, which captures the investments that economies make to produce more and better innovations.
- In Institutions (60), China's weaknesses are sub-pillar Regulatory environment (100) and its indicator Cost of redundancy dismissal (107).
- In Human capital & research (25), relative weaknesses are sub-pillar Tertiary education (94) and indicator Tertiary inbound mobility (101).
- In Infrastructure (26), China presents relative weaknesses in two indicators within the area Ecological sustainability - GDP per unit of energy use (94) and Environmental performance (97).
- Indicator Microfinance gross loans (69) is a relative GII weakness in Market sophistication (21).
- In Business sophistication (14), indicators R&D financed by abroad (93) and FDI inflows (88) are GII weaknesses for China.
- Three relative weaknesses are found in Creative outputs (12) in indicators National feature films (87), Printing & other media (79), and Wikipedia edits (111).

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP\$	GDP per capita, PPP\$	GII 2018 rank		
5	26	Upper middle	SEAO	1,415.0	25,313.3	18,109.8	17		
<b>INSTITUTIONS</b> ..... 64.1 60				<b>BUSINESS SOPHISTICATION</b> ..... 55.4 14					
1.1	<b>Political environment</b> .....		63.0	47	◆	5.1	<b>Knowledge workers</b> .....	84.9	[1]
1.1.1	Political and operational stability*		75.4	46		5.1.1	Knowledge-intensive employment, %.....	n/a	n/a
1.1.2	Government effectiveness*		56.8	47	◆	5.1.2	Firms offering formal training, % firms... <sup>Ⓞ</sup>	79.2	1
1.2	<b>Regulatory environment</b> .....		54.6	100	○	5.1.3	GERD performed by business, % GDP.....	1.7	12
1.2.1	Regulatory quality*		38.0	81		5.1.4	GERD financed by business, %.....	76.5	2
1.2.2	Rule of law*		39.4	77		5.1.5	Females employed w/advanced degrees, %.....	n/a	n/a
1.2.3	Cost of redundancy dismissal, salary weeks.....		27.4	107	○	5.2	<b>Innovation linkages</b> .....	27.2	58
1.3	<b>Business environment</b> .....		74.7	48		5.2.1	University/industry research collaboration†.....	56.5	27
1.3.1	Ease of starting a business*		93.5	25		5.2.2	State of cluster development†.....	59.6	28
1.3.2	Ease of resolving insolvency*		55.8	56		5.2.3	GERD financed by abroad, %.....	0.6	93
<b>HUMAN CAPITAL &amp; RESEARCH</b> ..... 47.6 25				<b>KNOWLEDGE &amp; TECHNOLOGY OUTPUTS</b> ... 57.2 5					
2.1	<b>Education</b> .....		63.4	[13]		5.3	<b>Knowledge absorption</b> .....	54.1	13
2.1.1	Expenditure on education, % GDP.....		n/a	n/a		5.3.1	Intellectual property payments, % total trade.....	1.1	30
2.1.2	Government funding/pupil, secondary, % GDP/cap... <sup>Ⓞ</sup>		n/a	n/a		5.3.2	High-tech imports, % total trade.....	23.3	4
2.1.3	School life expectancy, years.....		13.5	74		5.3.3	ICT services imports, % total trade.....	0.8	85
2.1.4	PISA scales in reading, maths, & science.....		514.3	8	◆	5.3.4	FDI net inflows, % GDP.....	1.7	88
2.1.5	Pupil-teacher ratio, secondary.....		13.3	59		5.3.5	Research talent, % in business enterprise.....	60.7	12
2.2	<b>Tertiary education</b> .....		20.6	94	○	6.1	<b>Knowledge creation</b> .....	68.1	4
2.2.1	Tertiary enrolment, % gross.....		51.0	55		6.1.1	Patents by origin/bn PPP\$ GDP.....	53.7	1
2.2.2	Graduates in science & engineering, %.....		n/a	n/a		6.1.2	PCT patents by origin/bn PPP\$ GDP.....	2.1	17
2.2.3	Tertiary inbound mobility, %.....		0.4	101	○	6.1.3	Utility models by origin/bn PPP\$ GDP.....	72.4	1
2.3	<b>Research &amp; development (R&amp;D)</b> .....		58.8	17	◆	6.1.4	Scientific & technical articles/bn PPP\$ GDP.....	11.9	42
2.3.1	Researchers, FTE/mn pop.....		1,234.8	46		6.1.5	Citable documents H-index.....	54.2	13
2.3.2	Gross expenditure on R&D, % GDP.....		2.1	15	◆	6.2	<b>Knowledge impact</b> .....	66.6	1
2.3.3	Global R&D companies, avg. exp. top 3, mn US\$.....		91.7	6	◆	6.2.1	Growth rate of PPP\$ GDP/worker, %.....	7.1	1
2.3.4	QS university ranking, average score top 3*.....		82.5	3	◆◆	6.2.2	New businesses/th pop. 15-64.....	n/a	n/a
<b>INFRASTRUCTURE</b> ..... 58.7 26				<b>CREATIVE OUTPUTS</b> ..... 48.3 12					
3.1	<b>Information &amp; communication technologies (ICTs)</b>		74.5	46		6.2.3	Computer software spending, % GDP.....	0.4	24
3.1.1	ICT access*.....		60.0	75		6.2.4	ISO 9001 quality certificates/bn PPP\$ GDP.....	16.9	20
3.1.2	ICT use*.....		61.5	55		6.2.5	High- & medium-high-tech manufactures, %..... <sup>Ⓞ</sup>	0.5	12
3.1.3	Government's online service*.....		86.1	34		6.3	<b>Knowledge diffusion</b> .....	37.0	22
3.1.4	E-participation*.....		90.5	29	◆	6.3.1	Intellectual property receipts, % total trade.....	0.1	56
3.2	<b>General infrastructure</b> .....		63.8	2	◆◆	6.3.2	High-tech net exports, % total trade.....	27.9	1
3.2.1	Electricity output, kWh/mn pop.....		4,487.7	48		6.3.3	ICT services exports, % total trade.....	1.2	75
3.2.2	Logistics performance*.....		72.1	26	◆	6.3.4	FDI net outflows, % GDP.....	1.4	42
3.2.3	Gross capital formation, % GDP.....		44.2	4	◆◆	7.1	<b>Intangible assets</b> .....	77.6	1
3.3	<b>Ecological sustainability</b> .....		37.9	67		7.1.1	Trademarks by origin/bn PPP\$ GDP.....	238.7	1
3.3.1	GDP/unit of energy use.....		6.6	94	○	7.1.2	Industrial designs by origin/bn PPP\$ GDP.....	26.3	1
3.3.2	Environmental performance*.....		50.7	97	○◆	7.1.3	ICTs & business model creation†.....	61.7	56
3.3.3	ISO 14001 environmental certificates/bn PPP\$ GDP..		7.1	14	◆	7.1.4	ICTs & organizational model creation†.....	59.7	46
<b>MARKET SOPHISTICATION</b> ..... 58.6 21				<b>7.2 Creative goods &amp; services</b> ..... 35.2 15					
4.1	<b>Credit</b> .....		45.3	43	◆	7.2.1	Cultural & creative services exports, % total trade.....	0.5	49
4.1.1	Ease of getting credit*.....		60.0	66		7.2.2	National feature films/mn pop. 15-69.....	0.8	87
4.1.2	Domestic credit to private sector, % GDP.....		155.8	7	◆	7.2.3	Entertainment & Media market/th pop. 15-69.....	6.9	42
4.1.3	Microfinance gross loans, % GDP.....		0.0	69	○	7.2.4	Printing & other media, % manufacturing... <sup>Ⓞ</sup>	0.8	79
4.2	<b>Investment</b> .....		42.2	64		7.2.5	Creative goods exports, % total trade.....	11.9	1
4.2.1	Ease of protecting minority investors*.....		60.0	61		7.3	<b>Online creativity</b> .....	2.7	79
4.2.2	Market capitalization, % GDP.....		70.2	22		7.3.1	Generic top-level domains (TLDs)/th pop. 15-69.....	2.4	75
4.2.3	Venture capital deals/bn PPP\$ GDP.....		0.1	22	◆	7.3.2	Country-code TLDs/th pop. 15-69.....	5.4	46
4.3	<b>Trade, competition, &amp; market scale</b> .....		88.2	2	◆◆	7.3.3	Wikipedia edits/mn pop. 15-69.....	0.3	111
4.3.1	Applied tariff rate, weighted avg., %.....		3.8	73		7.3.4	Mobile app creation/bn PPP\$ GDP.....	n/a	n/a
4.3.2	Intensity of local competition†.....		74.4	32					
4.3.3	Domestic market scale, bn PPP\$.....		25,313.3	1	◆◆				

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 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 AND GII MODEL

The following tables list data that are missing or are outdated for China.

### Missing data

Code	Indicator name	Country year	Model year	Source
2.1.1	Expenditure on education, % GDP	n/a	2015	UNESCO Institute for Statistics
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	2015	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	2017	Source: International Labour Organization
5.1.5	Females employed w/advanced degrees, %	n/a	2017	International Labour Organization
6.2.2	New businesses/th pop. 15–64	n/a	2016	World Bank
7.3.4	Mobile app creation/bn PPP\$ GDP	n/a	2018	App Annie

### Outdated data

Code	Indicator name	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
6.2.5	High- & medium-high-tech manufactures, %	2015	2016	United Nations Industrial Development Organization
7.2.4	Printing & other media, % manufacturing	2015	2016	United Nations Industrial Development Organization

### Model changes

The table below provides a summary of the adjustments to the GII 2019 framework.

#### Changes to the GII 2019 framework

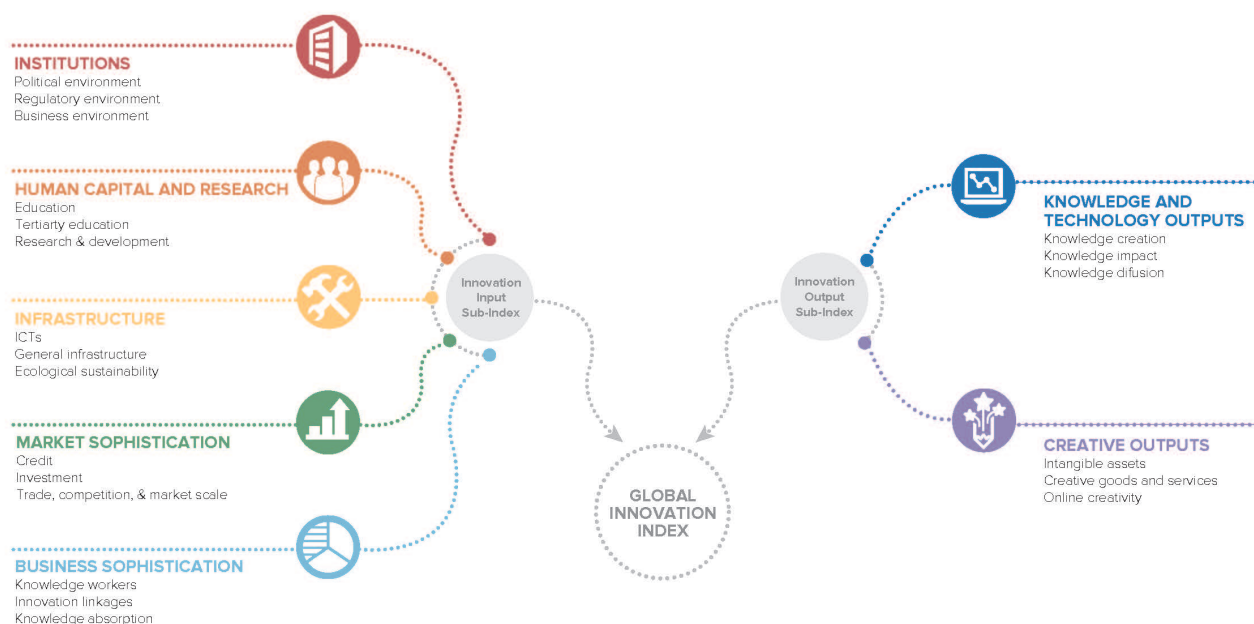
	GII 2018	Adjustment		GII 2019
1.1.1	Political stability & safety	Replaced	1.1.1	Political & operational stability
3.3.2	Environmental performance	Indicator changed at source	3.3.2	Environmental performance
5.3.1	Intellectual property payments, % total trade	Methodology change	5.3.1	Intellectual property payments, % total trade (3 year avg.)
5.3.2	High-tech imports, % total trade	Methodology change	5.3.2	High-tech imports, % total trade
6.2.1	Growth rate of PPP\$ GDP/worker, %	Methodology change	6.2.1	Growth rate of PPP\$ GDP/worker, % (3 year avg.)
6.3.1	Intellectual property receipts, % total trade	Methodology change	6.3.1	Intellectual property receipts, % total trade (3 year avg.)
7.3.4	Mobile app creation/bn PPP\$ GDP	Methodology change	7.3.4	Mobile app creation/bn PPP\$ GDP

# 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 GI presents its 12<sup>th</sup> edition devoted to the theme Creating Healthy Lives—The Future of Medical Innovation.

Recognizing that innovation is a key driver of economic development, the GI aims to provide a rich innovation ranking and analysis referencing around 130 economies. Over the last decade, the GI has established itself as both a leading reference on innovation and a “tool for action” for countries that incorporate the GI into their innovation agendas.

## Framework of the Global Innovation Index 2019



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 GI has two sub-indices: the Innovation Input Sub-Index and the Innovation Output Sub-Index, and seven pillars, each containing three sub-pillars.

