Global Innovation Index 2023

The Global Innovation Index (GII) **ranks world economies according to their innovation capabilities.**

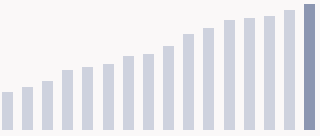
Consisting of **roughly 80 indicators**, grouped into innovation inputs and outputs, the GII **aims to capture the multi-dimensional facets of innovation**.

Singapore ranking in the Global Innovation Index 2023

> Singapore ranks 5th among the 132 economies featured in the GII 2023.

> Singapore ranks 5th among the 50 high-income group economies.

> Singapore ranks 1st among the 16 economies in South East Asia, East Asia, and Oceania.



> Singapore GII Ranking (2020-2023)

The table shows the rankings of Singapore over the past four years. 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 Singapore in the GII 2023 is between ranks 4 and 9.

	GII Position	Innovation Inputs	Innovation Outputs
2020	8th	1st	15th
2021	8th	1st	13th
2022	7th	1st	14th
2023	5th	1st	12th

Singapore performs worse in innovation outputs than innovation inputs in 2023.

This year Singapore ranks 1st in innovation inputs. This position is the same as last year.

Singapore ranks 12th in innovation outputs. This position is higher than last year.

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→ 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.

> Singapore is an innovation leader, ranking in the top 25 of the GII.

> Innovation overperformers relative to their economic development

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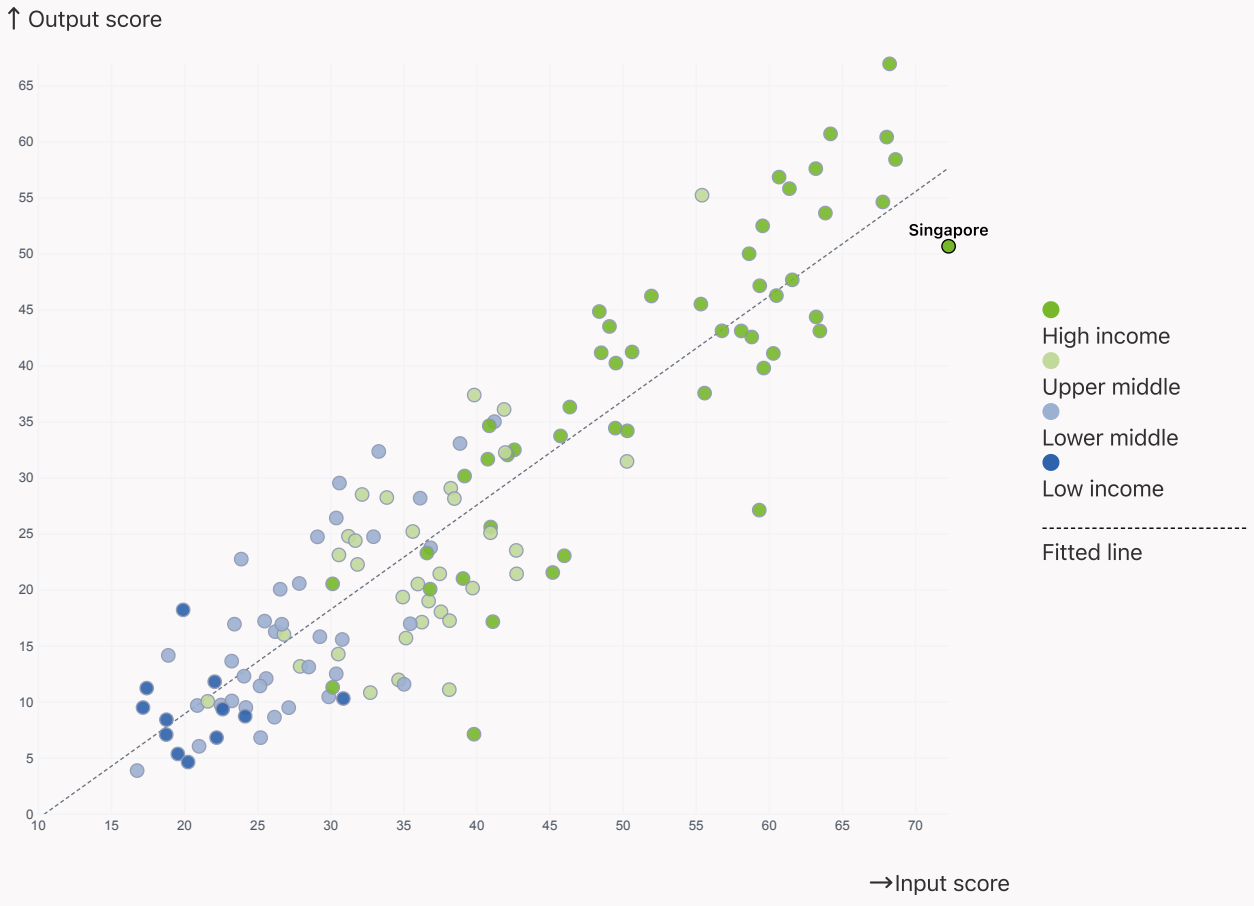
→ Effectively translating innovation investments into innovation outputs

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.

> Singapore produces less innovation outputs relative to its level of innovation investments.

> Relationship between innovation inputs and outputs



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→ Overview of Singapore's rankings in the seven areas of the GII in 2023

The chart shows the ranking for each of the seven areas that the GII comprises. The strongest areas for Singapore are those that rank above the GII (shown in blue) and the weakest are those that rank below.

> Highest rankings

Singapore ranks highest in Institutions (1st), Human capital and research (2nd) and Business sophistication (3rd).

> Lowest rankings

Singapore ranks lowest in Creative outputs (18th), Knowledge and technology outputs (10th) and Infrastructure (8th).

The full WIPO Intellectual Property Statistics profile for Singapore can be found on this link.

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→ Benchmark of Singapore against other country groupings for each of the seven areas of the GII Index

The charts shows the relative position of Singapore (blue bar) against other country groupings (grey bars), for each of the seven areas of the GII Index.

> High-Income economies

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

> South East Asia, East Asia, And Oceania

Singapore performs above the regional average in all the pillars.

Knowledge and technology outputs

- Top 10 | Score: 58.96
- Singapore | Score: 55.26
- High income | Score: 38.62
- SEAO | Score: 32.16

* South East Asia, East Asia, and Oceania

Creative outputs

- Top 10 | 56.09
- Singapore | 46.00
- High income | 40.27
- SEAO | 34.40

Business sophistication

- Singapore | 69.43
- Top 10 | 64.39
- High income | 46.38
- SEAO | 40.54

Market sophistication

- Singapore | 67.38
- Top 10 | 61.93
- SEAO | 47.18
- High income | 46.42

Human capital and research

- Singapore | 63.18
- Top 10 | 60.28
- High income | 46.30
- SEAO | 40.81

Infrastructure

- Singapore | 63.13
- Top 10 | 62.83
- High income | 55.85
- SEAO | 47.13

Institutions

- Singapore | 98.40
- Top 10 | 79.85
- High income | 68.16
- SEAO | 62.54

Global Innovation Index 2023

→ Innovation strengths and weaknesses in Singapore

The table below gives an overview of the indicator strengths and weaknesses of Singapore in the GII 2023.

> Singapore's main innovation strengths are **Cost of redundancy dismissal** (rank 1), **Cultural and creative services exports, % total trade** (rank 1) and **GitHub commits/mn pop. 15-69** (rank 1).

Strengths

Rank	Code	Indicator name
1	1.2.3	Cost of redundancy dismissal
1	7.2.1	Cultural and creative services exports, % total trade
1	7.3.3	GitHub commits/mn pop. 15-69
1	1.1.2	Government effectiveness
1	6.2.4	High-tech manufacturing, %
1	3.1.1	ICT access
1	3.2.2	Logistics performance
1	1.1.1	Operational stability for businesses
1	1.2.1	Regulatory quality
1	4.2.4	VC received, value, % GDP
1	4.2.3	VC recipients, deals/bn PPP$ GDP
2	5.1.1	Knowledge-intensive employment, %
2	2.1.4	PISA scales in reading, maths and science
2	1.3.1	Policies for doing business
3	4.3.1	Applied tariff rate, weighted avg., %
3	3.1.4	E-participation
3	5.1.5	Females employed w/advanced degrees, %
3	4.2.2	Venture capital (VC) investors, deals/bn PPP$ GDP

Weaknesses

Rank	Code	Indicator name
113	2.1.1	Expenditure on education, % GDP
88	4.3.2	Domestic industry diversification
87	7.1.2	Trademarks by origin/bn PPP$ GDP
69	3.2.3	Gross capital formation, % GDP
66	7.1.4	Industrial designs by origin/bn PPP$ GDP
62	7.2.2	National feature films/mn pop. 15-69
59	6.2.3	Software spending, % GDP
59	7.1.1	Intangible asset intensity, top 15, %
49	2.1.2	Government funding/pupil, secondary, % GDP/cap
38	5.2.3	GERD financed by abroad, % GDP

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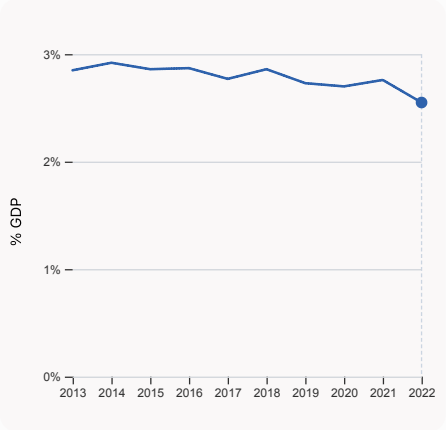
→ Singapore's innovation system

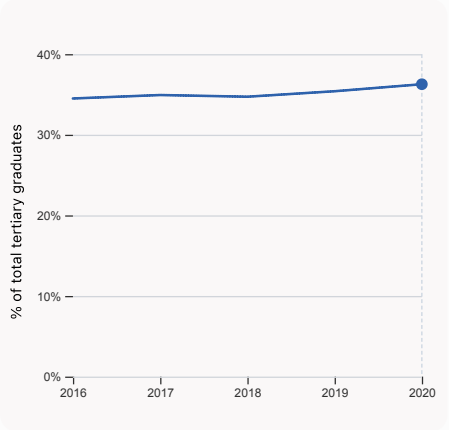
As far as practicable, the plots below present unscaled indicator data.

> Innovation inputs in Singapore



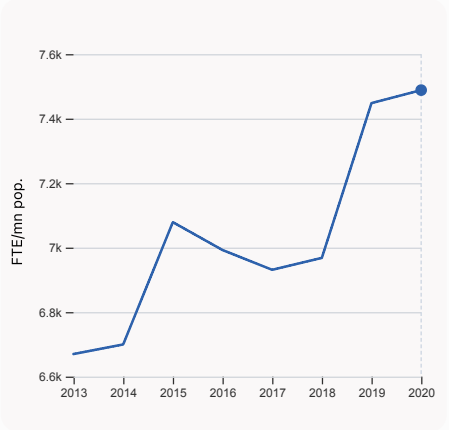
2.1.1 Expenditure on education, % GDP

was equal to 2.55% GDP in 2022, down by 0.21 percentage points from the year prior – and equivalent to an indicator rank of 113.



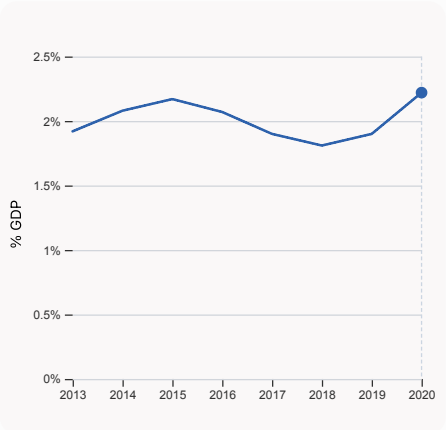
2.2.2 Graduates in science and engineering, %

was equal to 36.27% of total tertiary graduates in 2020, up by 0.87 percentage points from the year prior – and equivalent to an indicator rank of 6.



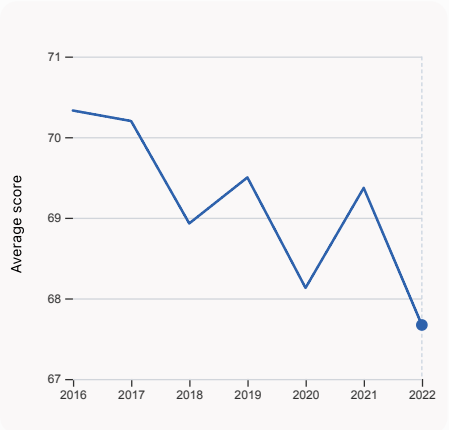
2.3.1 Researchers, FTE/mn pop.

was equal to 7,488.43 FTE/mn pop. in 2020, up by 0.54% from the year prior – and equivalent to an indicator rank of 5.



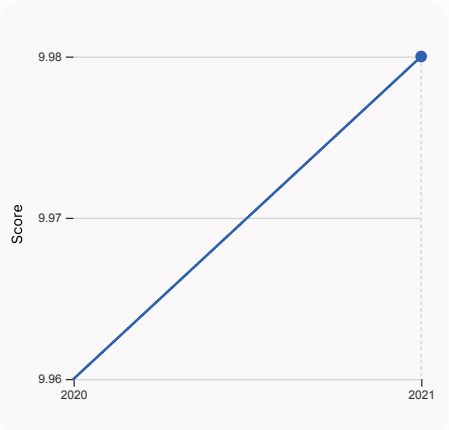
2.3.2 Gross expenditure on R&D, % GDP

was equal to 2.22% GDP in 2020, up by 0.32 percentage points from the year prior – and equivalent to an indicator rank of 16.



2.3.4 QS university ranking, top 3

was equal to an average score of 67.67 for the top 3 universities in 2022, down by 2.45% from the year prior – and equivalent to an indicator rank of 12.



3.1.1 ICT access

was equal to a score of 9.98 in 2021, up by 0.2% from the year prior – and equivalent to an indicator rank of 1.

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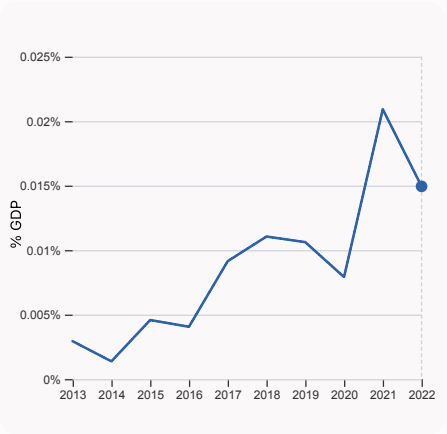
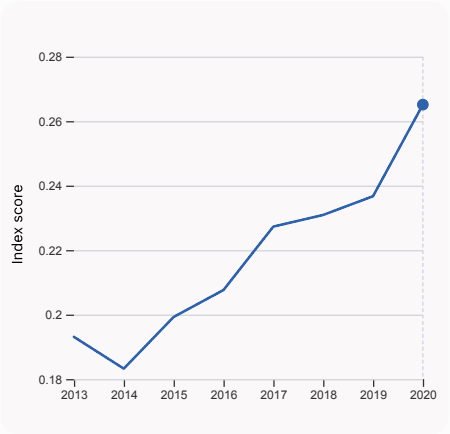


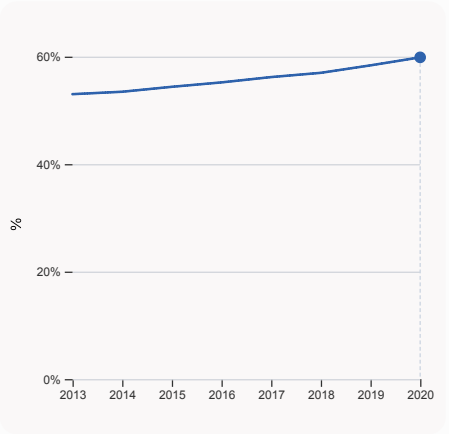
4.2.4 VC received, value, % GDP

was equal to 0.01494% GDP in 2022, down by 0.006 percentage points from the year prior – and equivalent to an indicator rank of 1.



4.3.2 Domestic industry diversification

was equal to an index score of 0.265 in 2020, up by 12.0027% from the year prior – and equivalent to an indicator rank of 88.



5.1.1 Knowledge-intensive employment, %

was equal to 59.87% in 2020, up by 1.49 percentage points from the year prior – and equivalent to an indicator rank of 2.

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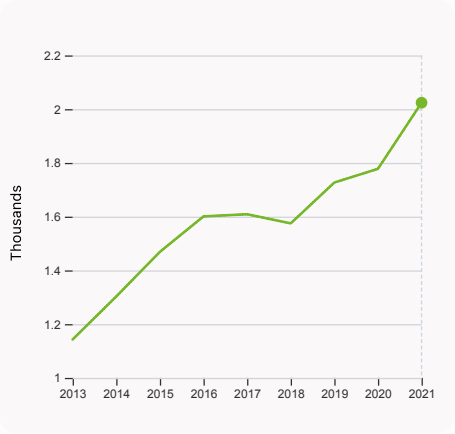
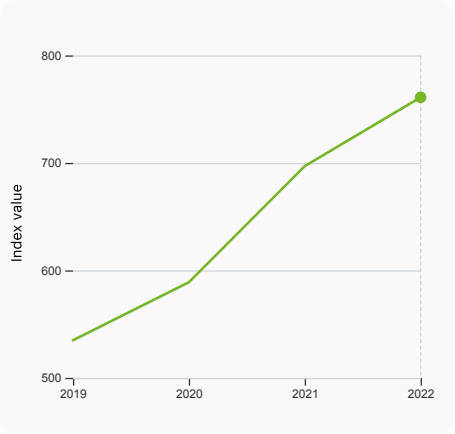
> Innovation outputs in Singapore



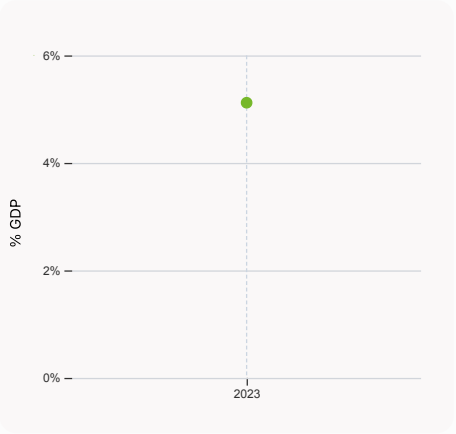
6.1.1 Patents by origin

was equal to 2.024 Thousands in 2021, up by 13.84% from the year prior – and equivalent to an indicator rank of 24.



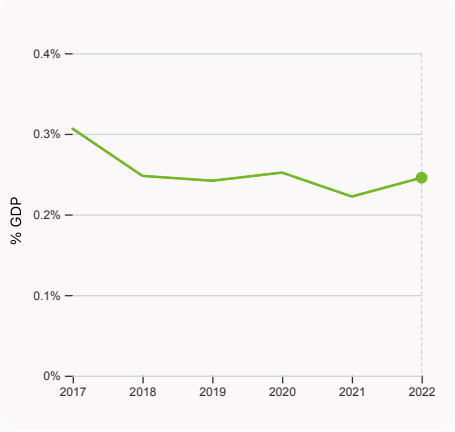
6.1.5 Citable documents H-index

was equal to an index value of 761 in 2022, up by 9.18% from the year prior – and equivalent to an indicator rank of 22.



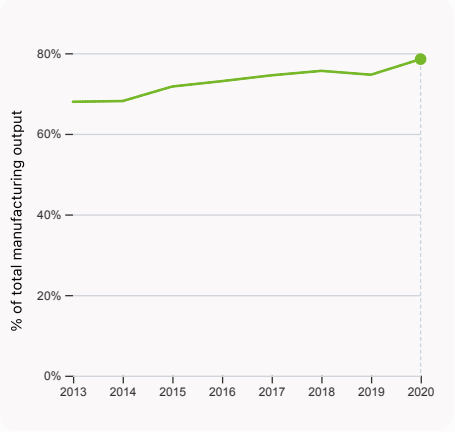
6.2.2 Unicorn valuation, % GDP

was equal to 5.12 % GDP in 2023 – and equivalent to an indicator rank of 8.



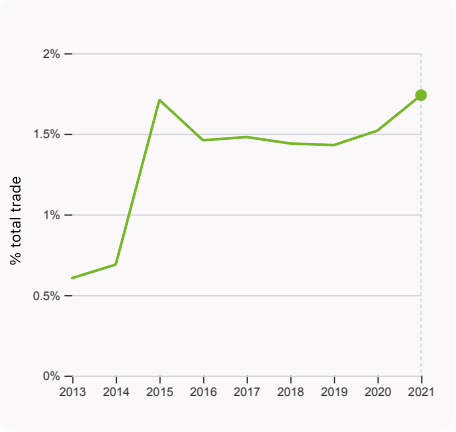
6.2.3 Software spending, % GDP

was equal to 0.246% GDP in 2022, up by 0.023 percentage points from the year prior – and equivalent to an indicator rank of 59.



6.2.4 High-tech manufacturing, %

was equal to 78.53% of total manufacturing output in 2020, up by 3.87 percentage points from the year prior – and equivalent to an indicator rank of 1.



6.3.1 Intellectual property receipts, % total trade

was equal to 1.74% total trade in 2021, up by 0.22 percentage points from the year prior – and equivalent to an indicator rank of 16.

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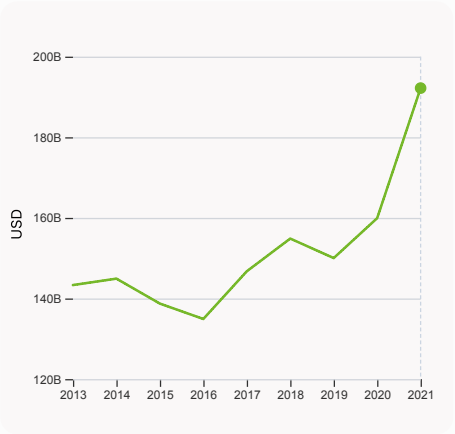
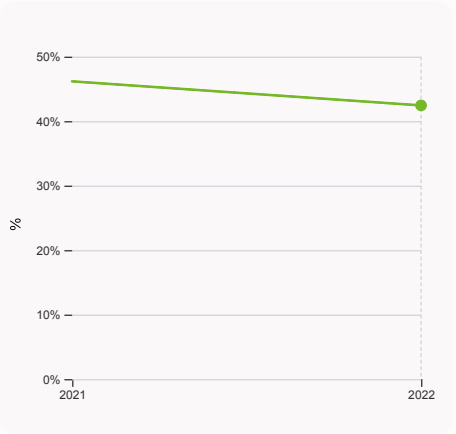
6.3.2 Production and export complexity

was equal to a score of 1.87 in 2020, down by 6.97% from the year prior – and equivalent to an indicator rank of 5.



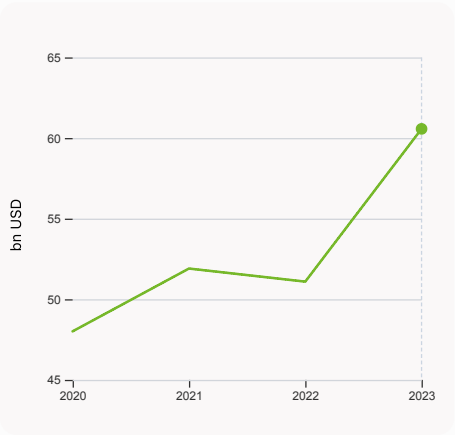
6.3.3 High-tech exports

was equal to 192,197,395,296 USD in 2021, up by 20.18% from the year prior – and equivalent to an indicator rank of 4.



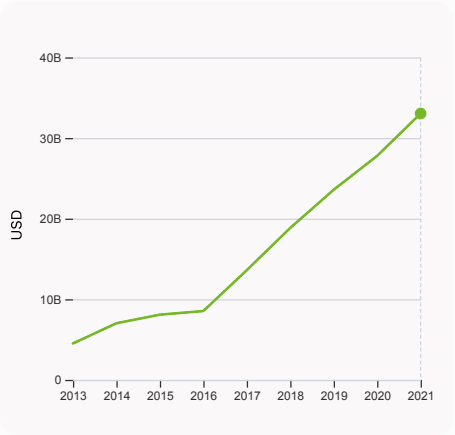
7.1.1 Intangible asset intensity, top 15, %

was equal to 42.44% in 2022, down by 3.73 percentage points from the year prior – and equivalent to an indicator rank of 59.



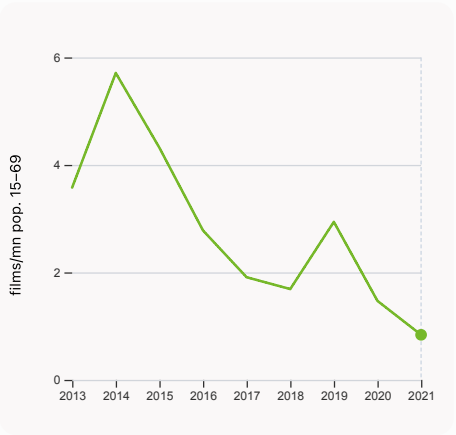
7.1.3 Global brand value, top 5,000

was equal to 60.568 bn USD in 2023, up by 18.54% from the year prior – and equivalent to an indicator rank of 11.



7.2.1 Cultural and creative services exports

was equal to 33,042,241,000 USD in 2021, up by 18.92% from the year prior – and equivalent to an indicator rank of 1.



7.2.2 National feature films/mn pop. 15-69

was equal to 0.839 films/mn pop. 15–69 in 2021, down by 42.95% from the year prior – and equivalent to an indicator rank of 62.

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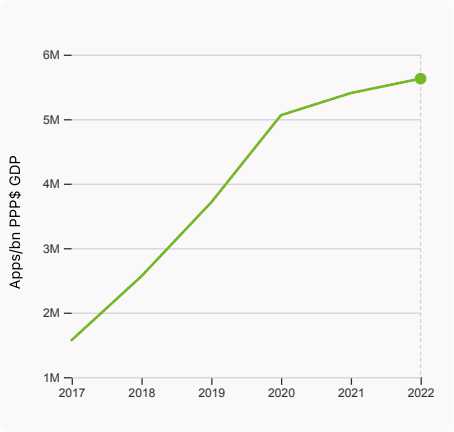

7.3.4 Mobile app creation/bn PPP$ GDP

was equal to 5,628,118.89 Apps/bn PPP$ GDP in 2022, up by 4.14% from the year prior – and equivalent to an indicator rank of 4.

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→ Singapore's innovation top performers

> 2.3.3 Global corporate R&D investors from Singapore

Rank	Firm	Industry	R&D	R&D Growth	R&D Intensity
			[mn EUR]	[%]	[%]
264	SEA	Software & Computer Services	727	135	8
548	GRAB HOLDINGS	Software & Computer Services	322	36	54
995	CHINA YUCHAI	Industrial Engineering	155	-1	5
1068	IGG	Leisure Goods	142	81	21

Source: European Commission's Joint Research Centre (https://iri.jrc.ec.europa.eu/scoreboard/2022-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 of Singapore's top universities

Rank	University	Score
11	NATIONAL UNIVERSITY OF SINGAPORE (NUS)	92.70
19	NANYANG TECHNOLOGICAL UNIVERSITY, SINGAPORE (NTU)	88.40
561-570	SINGAPORE MANAGEMENT UNIVERSITY	21.90

Source: QS Quacquarelli Symonds Ltd (https://www.topuniversities.com/university-rankings/world-university-rankings/2023).
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".

> 6.2.2 Top Unicorn Companies in Singapore

Rank	Unicorn Company	Industry	City	Valuation, bn USD
1	HYALROUTE	Mobile & telecommunications		4
2	MOGLIX	E-commerce & direct-to-consumer		3
3	CODA PAYMENTS	Fintech		3

Source: CBInsights, Tracker – The Complete List of Unicorn Companies: https://www.cbinsights.com/research-unicorn-companies

> 7.1.1 Top 15 intangible-asset intensive companies in Singapore

Rank	Firm	Intensity, %
1	DBS GROUP HOLDINGS LTD	29.92
2	SINGAPORE TELECOMMUNICATIONS LTD	53.68
3	SEA LTD	66.03

Source: Brand Finance (https://brandirectory.com/reports/gift-2022).
Note: Brand Finance only provides within economy ranks.

> 7.1.3 Top 5,000 companies in Singapore with highest global brand value

Rank	Brand	Industry	Brand Value, mn USD
1	DBS	Banking	10,509.2
2	UOB	Banking	5,540.2
3	OCBC BANK	Banking	5,411.9

Source: Brand Finance (https://brandirectory.com).
Note: Rank corresponds to within economy ranks.

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Singapore

GII 2023 rank **5**

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
12	1	High	SEAO	6.0	701.0	131,425.7

	Score / Value	Rank
Institutions	**98.4**	**1**
1.1 Institutional environment	**100.0**	**1**
1.1.1 Operational stability for businesses*	100.0	1 ●
1.1.2 Government effectiveness*	100.0	1 ●
1.2 Regulatory environment	**98.5**	**1**
1.2.1 Regulatory quality*	100.0	1 ●
1.2.2 Rule of law*	94.1	4
1.2.3 Cost of redundancy dismissal	8.0	1 ●
1.3 Business environment	**96.7**	**1**
1.3.1 Policies for doing business†	96.7	2 ●
1.3.2 Entrepreneurship policies and culture†	n/a	n/a
Human capital and research	**63.2**	**2**
2.1 Education	**58.2**	**46**
2.1.1 Expenditure on education, % GDP	2.5	113 ○ ◇
2.1.2 Government funding/pupil, secondary, % GDP/cap	20.6	49 ○
2.1.3 School life expectancy, years	16.6	25
2.1.4 PISA scales in reading, maths and science	556.5	2 ●
2.1.5 Pupil-teacher ratio, secondary	11.5	45
2.2 Tertiary education	**69.8**	**2**
2.2.1 Tertiary enrolment, % gross	93.1	9
2.2.2 Graduates in science and engineering, %	36.3	6
2.2.3 Tertiary inbound mobility, %	n/a	n/a
2.3 Research and development (R&D)	**61.5**	**14**
2.3.1 Researchers, FTE/mn pop.	7,488.4	5
2.3.2 Gross expenditure on R&D, % GDP	2.2	16
2.3.3 Global corporate R&D investors, top 3, mn US$	60.2	23
2.3.4 QS university ranking, top 3*	68.6	12
Infrastructure	**63.1**	**8**
3.1 Information and communication technologies (ICTs)	**94.5**	**5**
3.1.1 ICT access*	100.0	1 ●
3.1.2 ICT use*	84.7	40 ◇
3.1.3 Government's online service*	95.8	5
3.1.4 E-participation*	97.7	3 ●
3.2 General infrastructure	**57.2**	**9**
3.2.1 Electricity output, GWh/mn pop.	10,295.2	15
3.2.2 Logistics performance*	100.0	1 ●
3.2.3 Gross capital formation, % GDP	23.6	69 ○
3.3 Ecological sustainability	**37.6**	**37**
3.3.1 GDP/unit of energy use	16.3	20
3.3.2 Environmental performance*	54.2	37
3.3.3 ISO 14001 environment/bn PPP$ GDP	2.2	40
Market sophistication	**67.4**	**6**
4.1 Credit	**49.4**	**29**
4.1.1 Finance for startups and scaleups†	n/a	n/a
4.1.2 Domestic credit to private sector, % GDP	130.6	17
4.1.3 Loans from microfinance institutions, % GDP	n/a	n/a
4.2 Investment	**89.8**	**1**
4.2.1 Market capitalization, % GDP	185.7	6
4.2.2 Venture capital (VC) investors, deals/bn PPP$ GDP	1.9	3 ●
4.2.3 VC recipients, deals/bn PPP$ GDP	0.9	1 ●
4.2.4 VC received, value, % GDP	0.0	1 ●
4.3 Trade, diversification, and market scale	**63.0**	**45**
4.3.1 Applied tariff rate, weighted avg., %	0.1	3 ●
4.3.2 Domestic industry diversification	74.2	88 ○ ◇
4.3.3 Domestic market scale, bn PPP$	701.0	37

	Score / Value	Rank
Business sophistication	**69.4**	**3**
5.1 Knowledge workers	**72.3**	**5**
5.1.1 Knowledge-intensive employment, %	59.9	2 ●
5.1.2 Firms offering formal training, %	n/a	n/a
5.1.3 GERD performed by business, % GDP	1.4	18
5.1.4 GERD financed by business, %	58.3	16
5.1.5 Females employed w/advanced degrees, %	29.6	3 ●
5.2 Innovation linkages	**61.6**	**12**
5.2.1 University-industry R&D collaboration†	85.5	8
5.2.2 State of cluster development†	80.8	11
5.2.3 GERD financed by abroad, % GDP	0.1	38 ○
5.2.4 Joint venture/strategic alliance deals/bn PPP$ GDP	0.2	6
5.2.5 Patent families/bn PPP$ GDP	2.6	14
5.3 Knowledge absorption	**74.4**	**1**
5.3.1 Intellectual property payments, % total trade	2.6	9
5.3.2 High-tech imports, % total trade	24.3	5
5.3.3 ICT services imports, % total trade	4.0	9
5.3.4 FDI net inflows, % GDP	26.0	6
5.3.5 Research talent, % in businesses	54.2	19
Knowledge and technology outputs	**55.3**	**10**
6.1 Knowledge creation	**44.1**	**20**
6.1.1 Patents by origin/bn PPP$ GDP	3.2	24
6.1.2 PCT patents by origin/bn PPP$ GDP	2.5	11
6.1.3 Utility models by origin/bn PPP$ GDP	n/a	n/a
6.1.4 Scientific and technical articles/bn PPP$ GDP	n/a	n/a
6.1.5 Citable documents H-index	40.0	22
6.2 Knowledge impact	**69.2**	**2**
6.2.1 Labor productivity growth, %	2.1	31
6.2.2 Unicorn valuation, % GDP	5.1	8
6.2.3 Software spending, % GDP	0.2	59 ○ ◇
6.2.4 High-tech manufacturing, %	78.5	1 ●
6.3 Knowledge diffusion	**52.6**	**13**
6.3.1 Intellectual property receipts, % total trade	1.6	16
6.3.2 Production and export complexity	91.8	5
6.3.3 High-tech exports, % total trade	28.6	4
6.3.4 ICT services exports, % total trade	2.8	46
6.3.5 ISO 9001 quality/bn PPP$ GDP	6.9	42
Creative outputs	**46.0**	**18**
7.1 Intangible assets	**39.9**	**41** ◇
7.1.1 Intangible asset intensity, top 15, %	42.4	59 ○ ◇
7.1.2 Trademarks by origin/bn PPP$ GDP	23.7	87 ○ ◇
7.1.3 Global brand value, top 5,000	13.5	11
7.1.4 Industrial designs by origin/bn PPP$ GDP	1.1	66 ○ ◇
7.2 Creative goods and services	**47.2**	**6**
7.2.1 Cultural and creative services exports, % total trade	4.9	1 ●
7.2.2 National feature films/mn pop. 15-69	0.8	62 ○ ◇
7.2.3 Entertainment and media market/th pop. 15-69	42.1	20
7.2.4 Creative goods exports, % total trade	3.6	15
7.3 Online creativity	**56.9**	**16**
7.3.1 Generic top-level domains (TLDs)/th pop. 15-69	29.8	23
7.3.2 Country-code TLDs/th pop. 15-69	12.3	39 ◇
7.3.3 GitHub commits/mn pop. 15-69	100.0	1 ●
7.3.4 Mobile app creation/bn PPP$ GDP	85.5	4

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/gii-ranking. Square brackets [ ] indicate that the data minimum coverage (DMC) requirements were not met at the sub-pillar or pillar level.

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→ Data availability

The following tables list indicators that are either missing or outdated for Singapore.

> Singapore has missing data for six indicators and outdated data for six indicators.

> Missing data for Singapore

Code	Indicator name	Economy Year	Model Year	Source
1.3.2	Entrepreneurship policies and culture	n/a	2022	Global Entrepreneurship Monitor
2.2.3	Tertiary inbound mobility, %	n/a	2020	UNESCO Institute for Statistics
4.1.1	Finance for startups and scaleups	n/a	2022	Global Entrepreneurship Monitor
4.1.3	Loans from microfinance institutions, % GDP	n/a	2021	International Monetary Fund, Financial Access Survey (FAS)
5.1.2	Firms offering formal training, %	n/a	2019	World Bank Enterprise Surveys
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	2021	World Intellectual Property Organization; International Monetary Fund

> Outdated data for Singapore

Code	Indicator name	Economy Year	Model Year	Source
2.3.1	Researchers, FTE/mn pop.	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
2.3.2	Gross expenditure on R&D, % GDP	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
5.1.1	Knowledge-intensive employment, %	2020	2022	International Labour Organization
5.1.3	GERD performed by business, % GDP	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
5.1.5	Females employed w/advanced degrees, %	2021	2022	International Labour Organization
5.3.5	Research talent, % in businesses	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT

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→ 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, 2023.

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.