

Global Innovation Index 2023

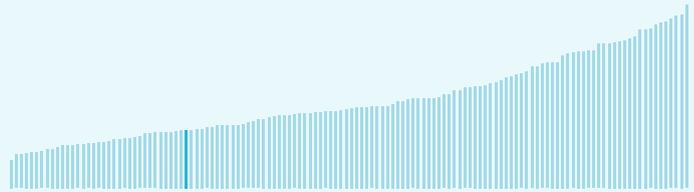


The Global Innovation Index (GII) **ranks world economies according to their innovation capabilities.**

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

Paraguay ranking in the Global Innovation Index 2023

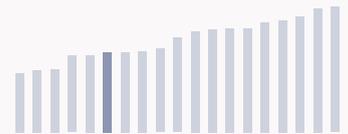
> Paraguay ranks **98th** among the 132 economies featured in the GII 2023.



> Paraguay ranks **31st** among the 33 upper-middle-income group economies.



> Paraguay ranks **14th** among the 19 economies in Latin America and the Caribbean.



> Paraguay GII Ranking (2020-2023)

The table shows the rankings of Paraguay 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 Paraguay in the GII 2023 is between ranks 91 and 102.

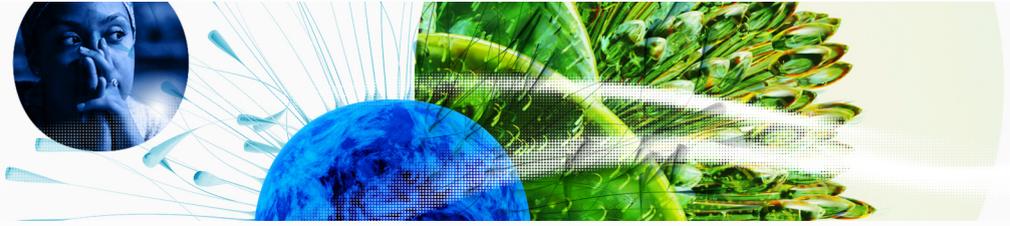
	GII Position	Innovation Inputs	Innovation Outputs
2020	97th	98th	92nd
2021	88th	90th	87th
2022	91st	94th	84th
2023	98th	101st	92nd

Paraguay performs better in innovation outputs than innovation inputs in 2023.

This year Paraguay ranks 101st in innovation inputs. This position is lower than last year.

Paraguay ranks 92nd in innovation outputs. This position is lower than last year.

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→ Expected vs. observed innovation performance

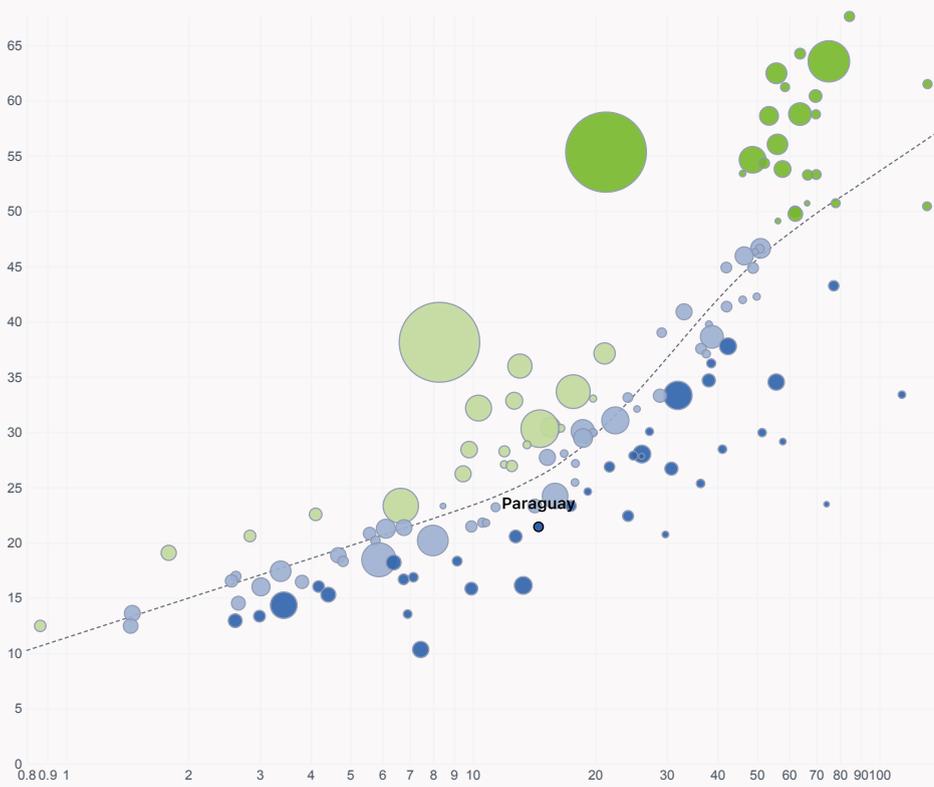
The bubble chart below shows the relationship between income levels (GDP per capita) and innovation performance (GII score). The trend line gives an indication of the expected innovation performance according to income level. Economies appearing above the trend line are performing better than expected and those below are performing below expectations.



> Relative to GDP, Paraguay's performance is below expectations for its level of development.

> Innovation overperformers relative to their economic development

↑ **GII Score**



- Innovation leader
- Performing above expectations for level of development
- Performing at expectations for level of development
- Performing below expectations for level of development

Size legend (Population)



→ GDP per capita, PPP logarithmic scale (thousands of \$)

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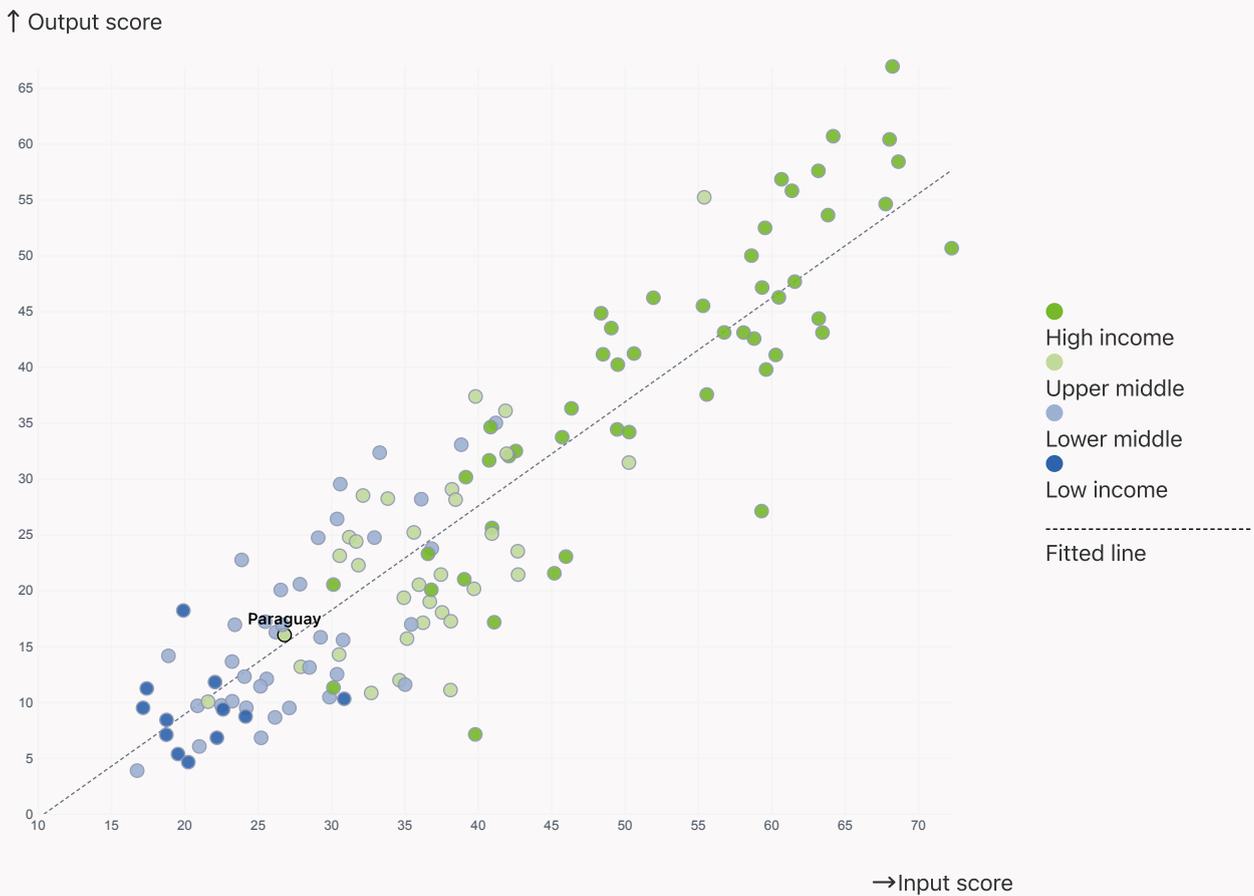
→ Effectively translating innovation investments into innovation outputs

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.



> Paraguay produces more innovation outputs relative to its level of innovation investments.

> Relationship between innovation inputs and outputs

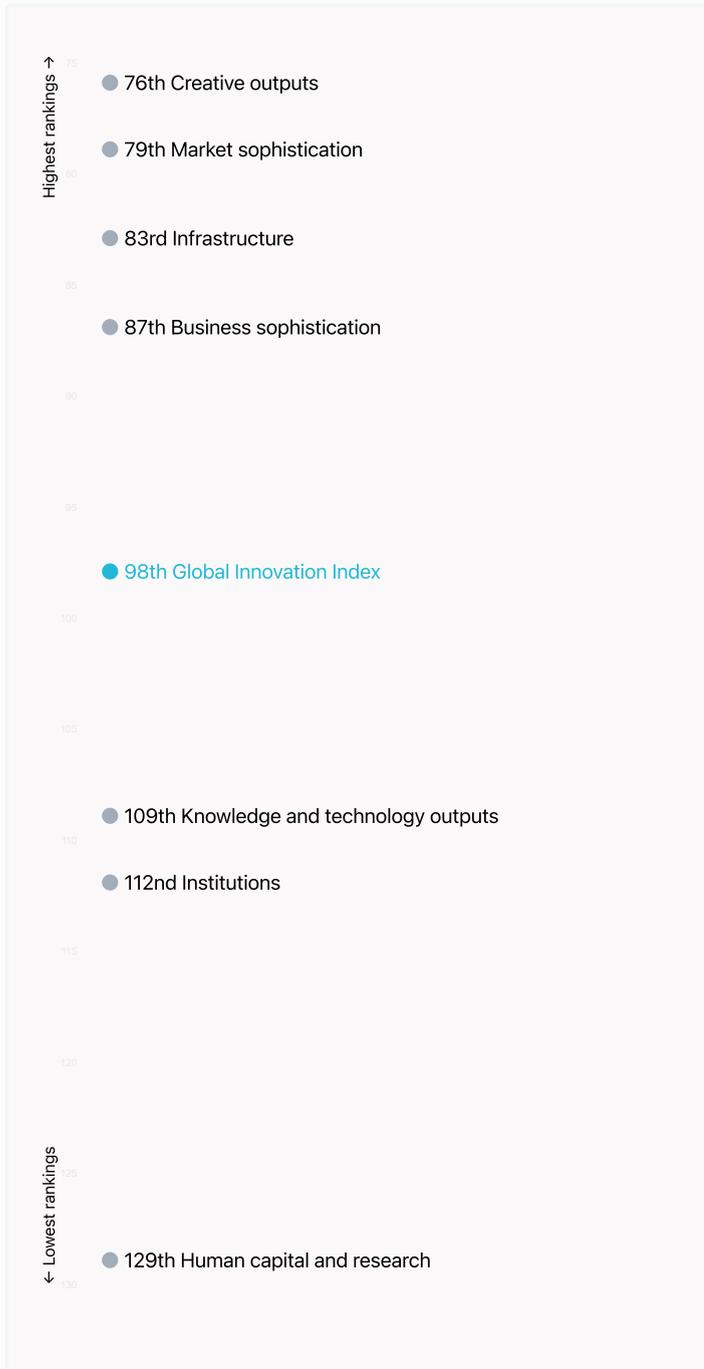


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→ Overview of Paraguay's rankings in the seven areas of the GII in 2023

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



> Highest rankings



Paraguay ranks highest in Creative outputs (76th), Market sophistication (79th), Infrastructure (83rd) and Business sophistication (87th).

> Lowest rankings



Paraguay ranks lowest in Human capital and research (129th), Institutions (112nd) and Knowledge and technology outputs (109th).

The full WIPO Intellectual Property Statistics profile for Paraguay can be found on [this link](#).

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

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

> Upper-Middle-Income economies

Paraguay performs below the upper-middle-income group average in all the pillars.



> Latin America And The Caribbean

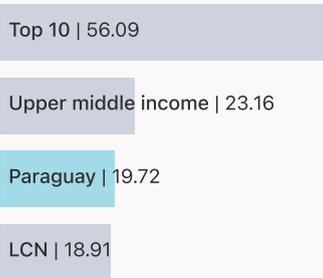
Paraguay performs below the regional average in Knowledge and technology outputs, Business sophistication, Human capital and research, Infrastructure, and Institutions.



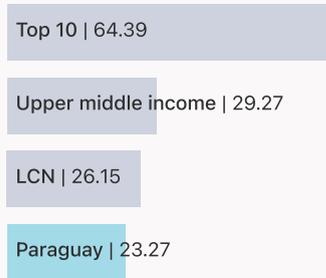
Knowledge and technology outputs



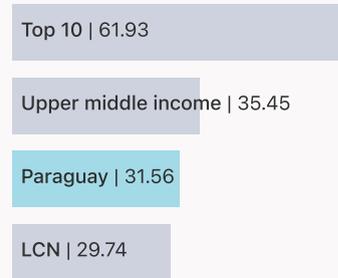
Creative outputs



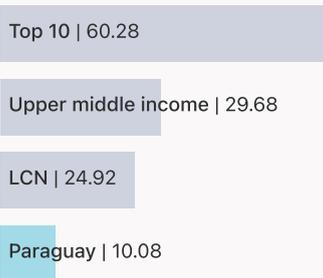
Business sophistication



Market sophistication



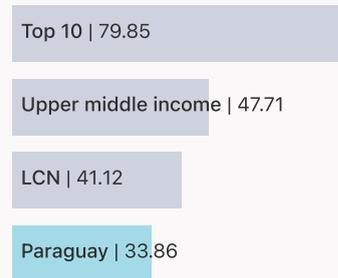
Human capital and research



Infrastructure



Institutions





→ Innovation strengths and weaknesses in Paraguay

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



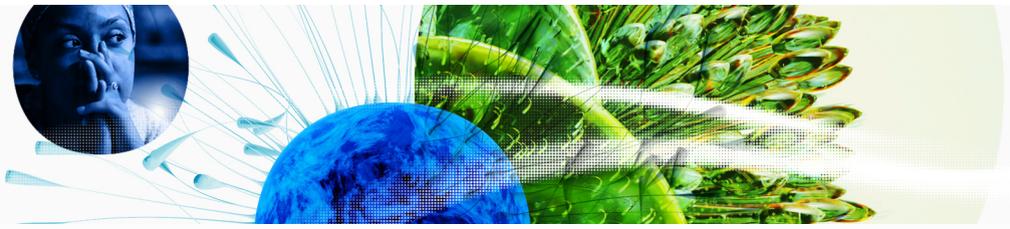
> Paraguay's main innovation strengths are **Trademarks by origin/bn PPP\$ GDP (rank 6)**, **High-tech imports, % total trade (rank 8)** and **Firms offering formal training, % (rank 23)**.

Strengths

Weaknesses

Rank	Code	Indicator name	Rank	Code	Indicator name
6	7.1.2	Trademarks by origin/bn PPP\$ GDP	132	5.3.3	ICT services imports, % total trade
8	5.3.2	High-tech imports, % total trade	127	6.3.4	ICT services exports, % total trade
23	5.1.2	Firms offering formal training, %	125	5.2.1	University-industry R&D collaboration
39	3.2.1	Electricity output, GWh/mn pop.	107	7.2.1	Cultural and creative services exports, % total trade
43	3.3.1	GDP/unit of energy use	96	5.1.4	GERD financed by business, %
61	6.3.5	ISO 9001 quality/bn PPP\$ GDP	84	4.1.1	Finance for startups and scaleups
62	3.2.3	Gross capital formation, % GDP	74	7.1.3	Global brand value, top 5,000
69	3.3.2	Environmental performance	71	2.3.4	QS university ranking, top 3
73	4.1.2	Domestic credit to private sector, % GDP	48	6.2.2	Unicorn valuation, % GDP
75	7.3.2	Country-code TLDs/th pop. 15-69	40	2.3.3	Global corporate R&D investors, top 3, mn US\$

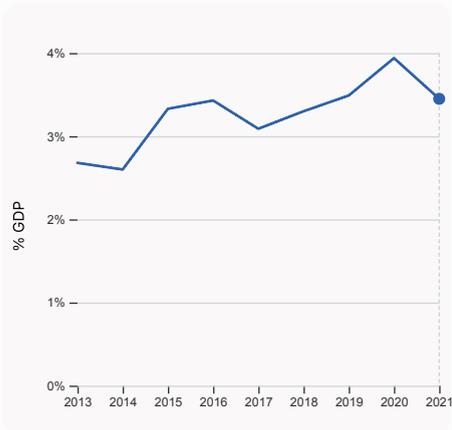
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→ Paraguay's innovation system

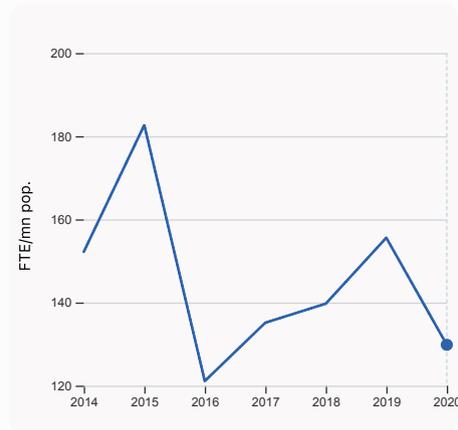
As far as practicable, the plots below present unscaled indicator data.

> Innovation inputs in Paraguay



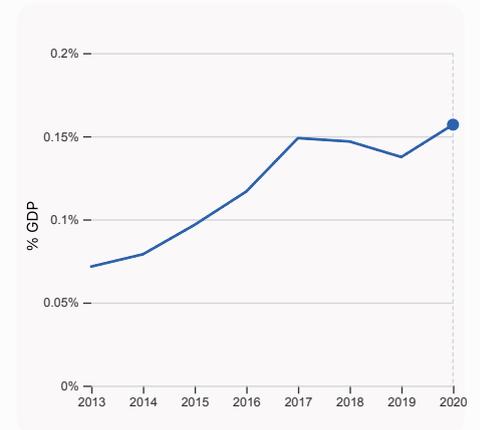
2.1.1 Expenditure on education, % GDP

was equal to 3.45% GDP in 2021, down by 0.49 percentage points from the year prior – and equivalent to an indicator rank of 94.



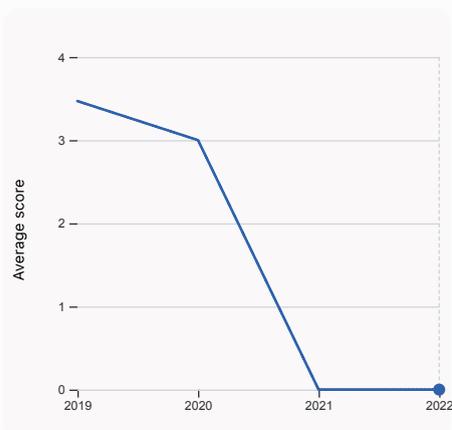
2.3.1 Researchers, FTE/mn pop.

was equal to 129.83 FTE/mn pop. in 2020, down by 16.55% from the year prior – and equivalent to an indicator rank of 87.



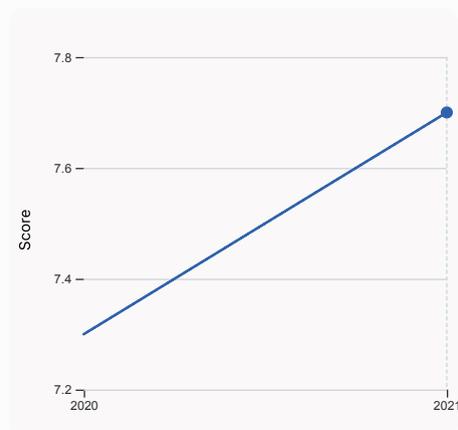
2.3.2 Gross expenditure on R&D, % GDP

was equal to 0.157% GDP in 2020, up by 0.019 percentage points from the year prior – and equivalent to an indicator rank of 96.



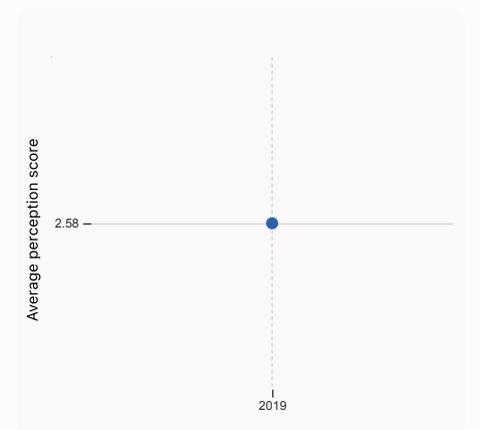
2.3.4 QS university ranking, top 3

was equal to an average score of 0 for the top 3 universities in 2022, equivalent to an indicator rank of 71.



3.1.1 ICT access

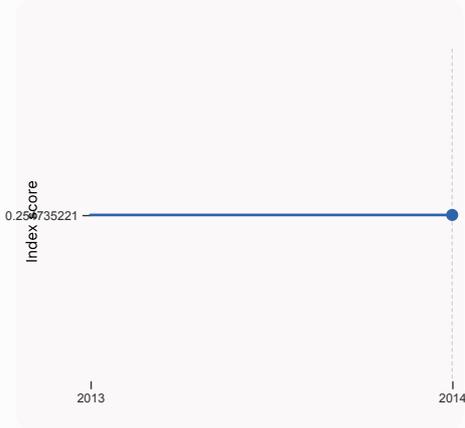
was equal to a score of 7.7 in 2021, up by 5.48% from the year prior – and equivalent to an indicator rank of 93.



4.1.1 Finance for startups and scaleups

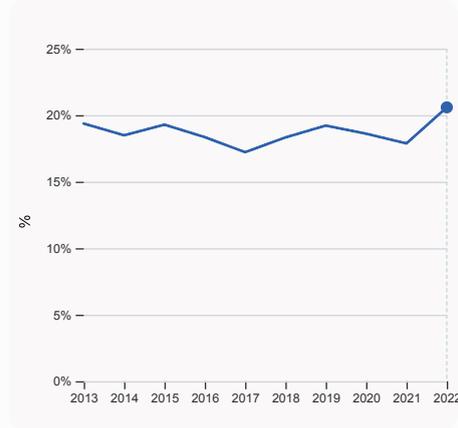
was equal to an average perception score of 2.58 in 2019, equivalent to an indicator rank of 84.

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4.3.2 Domestic industry diversification

was equal to an index score of 0.255 in 2014, with no change from the year prior – and equivalent to an indicator rank of 86.



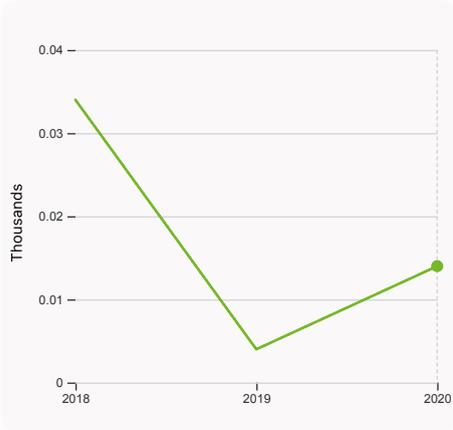
5.1.1 Knowledge-intensive employment, %

was equal to 20.59% in 2022, up by 2.71 percentage points from the year prior – and equivalent to an indicator rank of 74.

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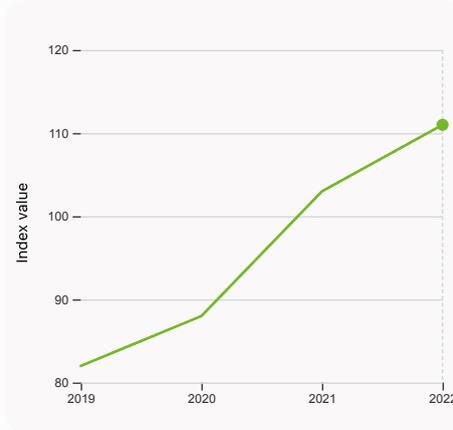


> Innovation outputs in Paraguay



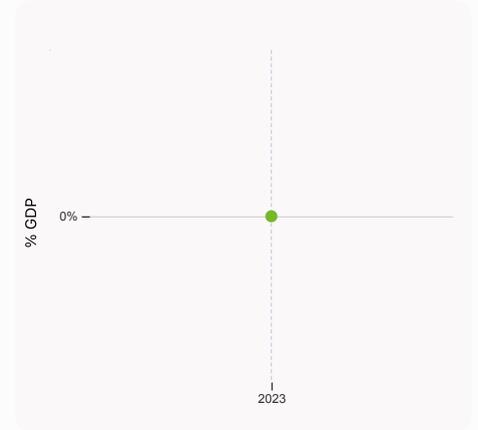
6.1.1 Patents by origin

was equal to 0.014 Thousands in 2020, up by 250% from the year prior – and equivalent to an indicator rank of 105.



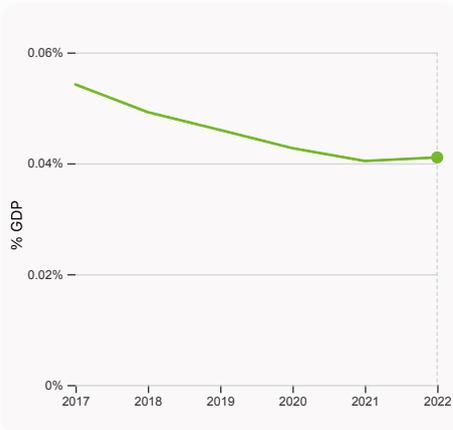
6.1.5 Citable documents H-index

was equal to an index value of 111 in 2022, up by 7.77% from the year prior – and equivalent to an indicator rank of 118.



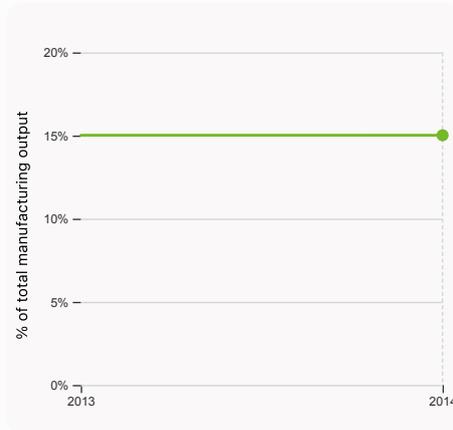
6.2.2 Unicorn valuation, % GDP

was equal to 0 % GDP in 2023 – and equivalent to an indicator rank of 48.



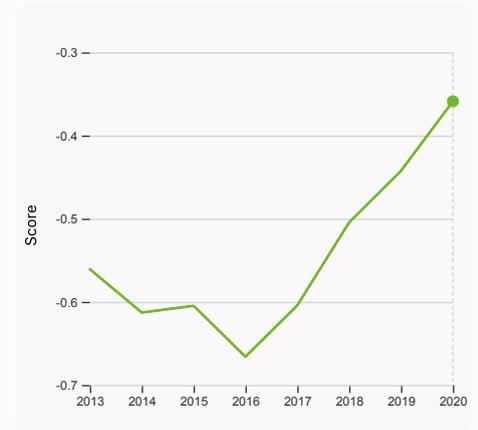
6.2.3 Software spending, % GDP

was equal to 0.041% GDP in 2022, up by 0.00064 percentage points from the year prior – and equivalent to an indicator rank of 110.



6.2.4 High-tech manufacturing, %

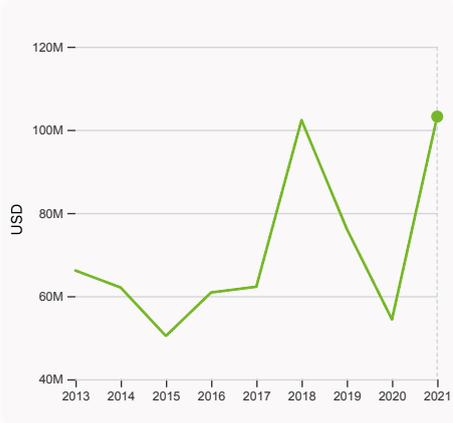
was equal to 15.02% of total manufacturing output in 2014, up by with no change from the year prior – and equivalent to an indicator rank of 77.



6.3.2 Production and export complexity

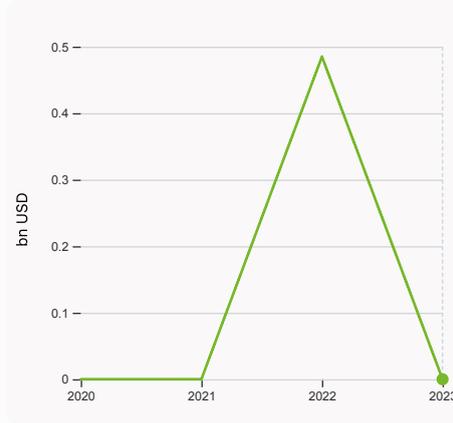
was equal to a score of -0.359 in 2020, up by 18.9% from the year prior – and equivalent to an indicator rank of 83.

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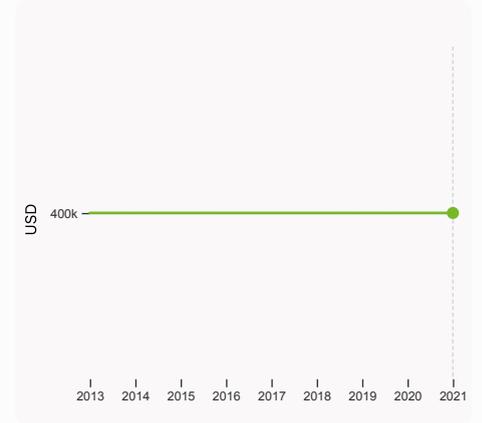
6.3.3 High-tech exports

was equal to 103,189,076 USD in 2021, up by 89.69% from the year prior – and equivalent to an indicator rank of 77.



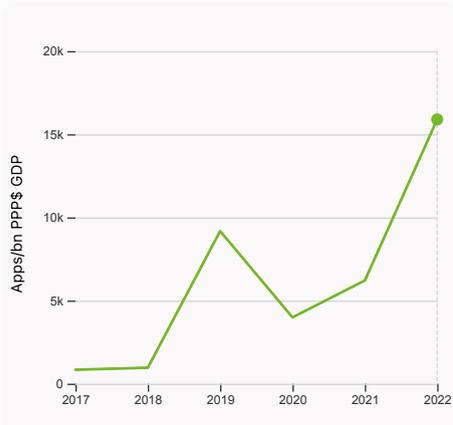
7.1.3 Global brand value, top 5,000

was equal to 0 bn USD in 2023, down by 100% from the year prior – and equivalent to an indicator rank of 74.



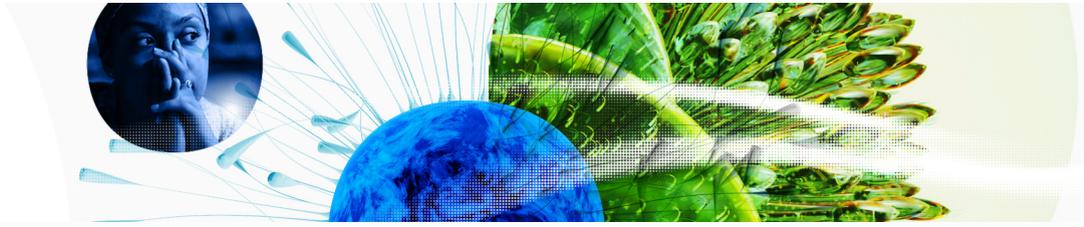
7.2.1 Cultural and creative services exports

was equal to 400,000 USD in 2021, up by with no change from the year prior – and equivalent to an indicator rank of 107.



7.3.4 Mobile app creation/bn PPP\$ GDP

was equal to 15,893.62 Apps/bn PPP\$ GDP in 2022, up by 155.97% from the year prior – and equivalent to an indicator rank of 100.



→ Paraguay's innovation top performers

> 2.3.4 QS university ranking of Paraguay's top universities

Rank	University	Score
1001-1200	UNIVERSIDAD NACIONAL DE ASUNCION	9.20

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".

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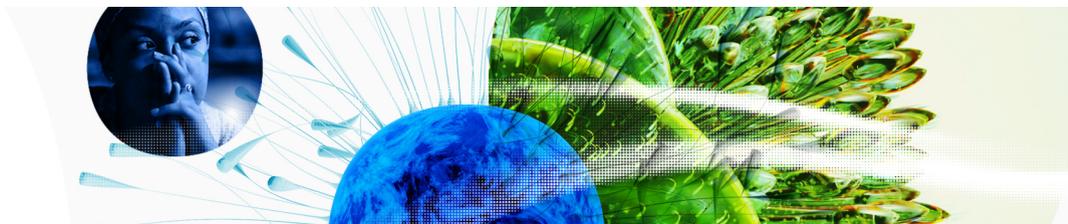
GII 2023 rank

98

Paraguay

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP\$ (bn)	GDP per capita, PPP\$
92	101	Upper middle	LCN	6.8	108.3	14,528.4
Score / Value Rank				Score / Value Rank		
Institutions				Business sophistication		
33.9 112 ◇				23.3 87		
1.1 Institutional environment				5.1 Knowledge workers		
32.0 97				29.7 71 ●◆		
1.1.1 Operational stability for businesses*				20.6 74		
1.1.2 Government effectiveness*				● 46.4 23 ●◆		
1.2 Regulatory environment				● 46.4 23 ●◆		
43.8 114 ◇				● 46.4 23 ●◆		
1.2.1 Regulatory quality*				○ 0.2 96 ○◇		
1.2.2 Rule of law*				● 9.5 78		
1.2.3 Cost of redundancy dismissal				5.2 Innovation linkages		
29.4 117 ◇				9.2 120 ◇		
1.3 Business environment				5.2.1 University-industry R&D collaboration+		
25.8 108				11.6 125 ○◇		
1.3.1 Policies for doing business+				5.2.2 State of cluster development+		
37.4 94				22.2 108 ◇		
1.3.2 Entrepreneurship policies and culture+				5.2.3 GERD financed by abroad, % GDP		
● 14.1 74 ◇				0.0 65		
Human capital and research				5.2.4 Joint venture/strategic alliance deals/bn PPP\$ GDP		
10.1 [129]				n/a n/a		
2.1 Education				5.2.5 Patent families/bn PPP\$ GDP		
19.2 [127]				0.0 88		
2.1.1 Expenditure on education, % GDP				5.3 Knowledge absorption		
3.5 94				31.0 76		
2.1.2 Government funding/pupil, secondary, % GDP/cap				5.3.1 Intellectual property payments, % total trade		
12.6 85				0.1 97 ◇		
2.1.3 School life expectancy, years				5.3.2 High-tech imports, % total trade		
n/a n/a				19.4 8 ●◆		
2.1.4 PISA scales in reading, maths and science				5.3.3 ICT services imports, % total trade		
n/a n/a				0.0 132 ○◇		
2.1.5 Pupil-teacher ratio, secondary				5.3.4 FDI net inflows, % GDP		
n/a n/a				0.6 110 ◇		
2.2 Tertiary education				5.3.5 Research talent, % in businesses		
n/a [n/a]				n/a n/a		
2.2.1 Tertiary enrolment, % gross				Knowledge and technology outputs		
n/a n/a				12.3 109 ◇		
2.2.2 Graduates in science and engineering, %				6.1 Knowledge creation		
n/a n/a				3.0 121		
2.2.3 Tertiary inbound mobility, %				6.1.1 Patents by origin/bn PPP\$ GDP		
n/a n/a				● 0.2 105		
2.3 Research and development (R&D)				6.1.2 PCT patents by origin/bn PPP\$ GDP		
1.0 100				n/a n/a		
2.3.1 Researchers, FTE/mn pop.				● 1.1 60		
● 129.8 87 ◇				6.1.4 Scientific and technical articles/bn PPP\$ GDP		
2.3.2 Gross expenditure on R&D, % GDP				n/a n/a		
● 0.2 96				6.1.5 Citable documents H-index		
2.3.3 Global corporate R&D investors, top 3, mn US\$				3.8 118		
0.0 40 ○◇				6.2 Knowledge impact		
2.3.4 QS university ranking, top 3*				16.0 121 ◇		
0.0 71 ○◇				6.2.1 Labor productivity growth, %		
Infrastructure				-0.1 103		
35.4 83				6.2.2 Unicorn valuation, % GDP		
3.1 Information and communication technologies (ICTs)				0.0 48 ○◇		
57.9 86				0.0 110 ◇		
3.1.1 ICT access*				6.2.3 Software spending, % GDP		
65.4 93 ◇				0.0 110 ◇		
3.1.2 ICT use*				6.2.4 High-tech manufacturing, %		
59.6 93				● 15.0 77		
3.1.3 Government's online service*				6.3 Knowledge diffusion		
56.4 84				17.8 83		
3.1.4 E-participation*				6.3.1 Intellectual property receipts, % total trade		
50.0 75				n/a n/a		
3.2 General infrastructure				6.3.2 Production and export complexity		
25.2 73 ●◆				45.0 83		
3.2.1 Electricity output, GWh/mn pop.				6.3.3 High-tech exports, % total trade		
5,524.9 39 ●◆				0.8 77		
3.2.2 Logistics performance*				6.3.4 ICT services exports, % total trade		
27.3 76				0.1 127 ○		
3.2.3 Gross capital formation, % GDP				6.3.5 ISO 9001 quality/bn PPP\$ GDP		
24.2 62 ●◆				4.2 61 ●◆		
3.3 Ecological sustainability				Creative outputs		
23.2 69 ●◆				19.7 76		
3.3.1 GDP/unit of energy use				7.1 Intangible assets		
12.3 43 ●◆				32.0 64 ●◆		
3.3.2 Environmental performance*				7.1.1 Intangible asset intensity, top 15, %		
37.3 69 ●◆				n/a n/a		
3.3.3 ISO 14001 environment/bn PPP\$ GDP				7.1.2 Trademarks by origin/bn PPP\$ GDP		
0.4 92				● 131.9 6 ●◆		
Market sophistication				7.1.3 Global brand value, top 5,000		
31.6 79				0.0 74 ○◇		
4.1 Credit				7.1.4 Industrial designs by origin/bn PPP\$ GDP		
12.5 108 ◇				● 0.3 96		
4.1.1 Finance for startups and scaleups+				7.2 Creative goods and services		
● 7.5 84 ○◇				0.6 [119]		
4.1.2 Domestic credit to private sector, % GDP				7.2.1 Cultural and creative services exports, % total trade		
50.0 73 ●◆				0.0 107 ○◇		
4.1.3 Loans from microfinance institutions, % GDP				7.2.2 National feature films/mn pop. 15-69		
n/a n/a				n/a n/a		
4.2 Investment				7.2.3 Entertainment and media market/th pop. 15-69		
n/a [n/a]				n/a n/a		
4.2.1 Market capitalization, % GDP				7.2.4 Creative goods exports, % total trade		
n/a n/a				0.1 95		
4.2.2 Venture capital (VC) investors, deals/bn PPP\$ GDP				7.3 Online creativity		
n/a n/a				14.3 102		
4.2.3 VC recipients, deals/bn PPP\$ GDP				7.3.1 Generic top-level domains (TLDs)/th pop. 15-69		
n/a n/a				1.9 86		
4.2.4 VC received, value, % GDP				7.3.2 Country-code TLDs/th pop. 15-69		
n/a n/a				1.7 75 ●◆		
4.3 Trade, diversification, and market scale				7.3.3 GitHub commits/mn pop. 15-69		
50.6 84				2.4 96		
4.3.1 Applied tariff rate, weighted avg., %				7.3.4 Mobile app creation/bn PPP\$ GDP		
4.0 84				51.3 100		
4.3.2 Domestic industry diversification						
● 75.7 86						
4.3.3 Domestic market scale, bn PPP\$						
108.3 86						

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.



→ Data availability

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

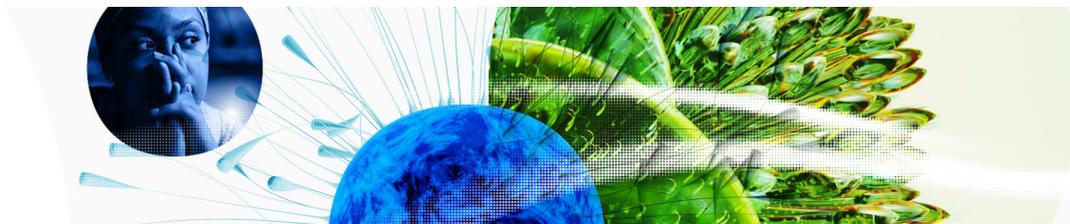


> Paraguay has missing data for nineteen indicators and outdated data for twelve indicators.

> Missing data for Paraguay

Code	Indicator name	Economy Year	Model Year	Source
2.1.3	School life expectancy, years	n/a	2020	UNESCO Institute for Statistics
2.1.4	PISA scales in reading, maths and science	n/a	2018	OECD, PISA
2.1.5	Pupil-teacher ratio, secondary	n/a	2020	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	n/a	2020	UNESCO Institute for Statistics
2.2.2	Graduates in science and engineering, %	n/a	2020	UNESCO Institute for Statistics; Eurostat; OECD
2.2.3	Tertiary inbound mobility, %	n/a	2020	UNESCO Institute for Statistics
4.1.3	Loans from microfinance institutions, % GDP	n/a	2021	International Monetary Fund, Financial Access Survey (FAS)
4.2.1	Market capitalization, % GDP	n/a	2020	World Federation of Exchanges; World Bank
4.2.2	Venture capital (VC) investors, deals/bn PPP\$ GDP	n/a	2022	Refinitiv; International Monetary Fund
4.2.3	VC recipients, deals/bn PPP\$ GDP	n/a	2022	Refinitiv; International Monetary Fund
4.2.4	VC received, value, % GDP	n/a	2022	Refinitiv; International Monetary Fund
5.1.3	GERD performed by business, % GDP	n/a	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
5.2.4	Joint venture/strategic alliance deals/bn PPP\$ GDP	n/a	2022	Refinitiv; International Monetary Fund
5.3.5	Research talent, % in businesses	n/a	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
6.1.2	PCT patents by origin/bn PPP\$ GDP	n/a	2022	World Intellectual Property Organization; International Monetary Fund
6.3.1	Intellectual property receipts, % total trade	n/a	2021	World Trade Organization and United Nations Conference on Trade and Development
7.1.1	Intangible asset intensity, top 15, %	n/a	2022	Brand Finance
7.2.2	National feature films/mn pop. 15-69	n/a	2021	OMDIA; United Nations, World Population

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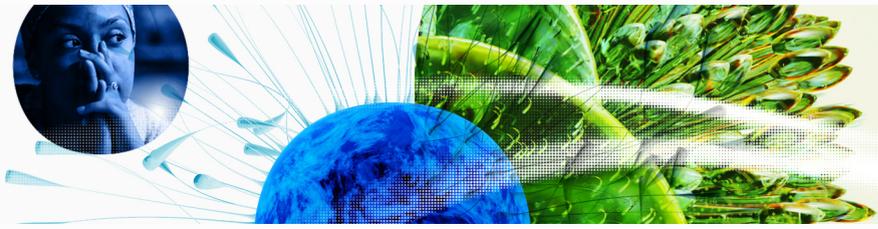
Code	Indicator name	Economy Year	Model Year	Source
				Prospects
7.2.3	Entertainment and media market/th pop. 15-69	n/a	2022	PwC, GEMO; United Nations, World Population Prospects; International Monetary Fund



> Outdated data for Paraguay

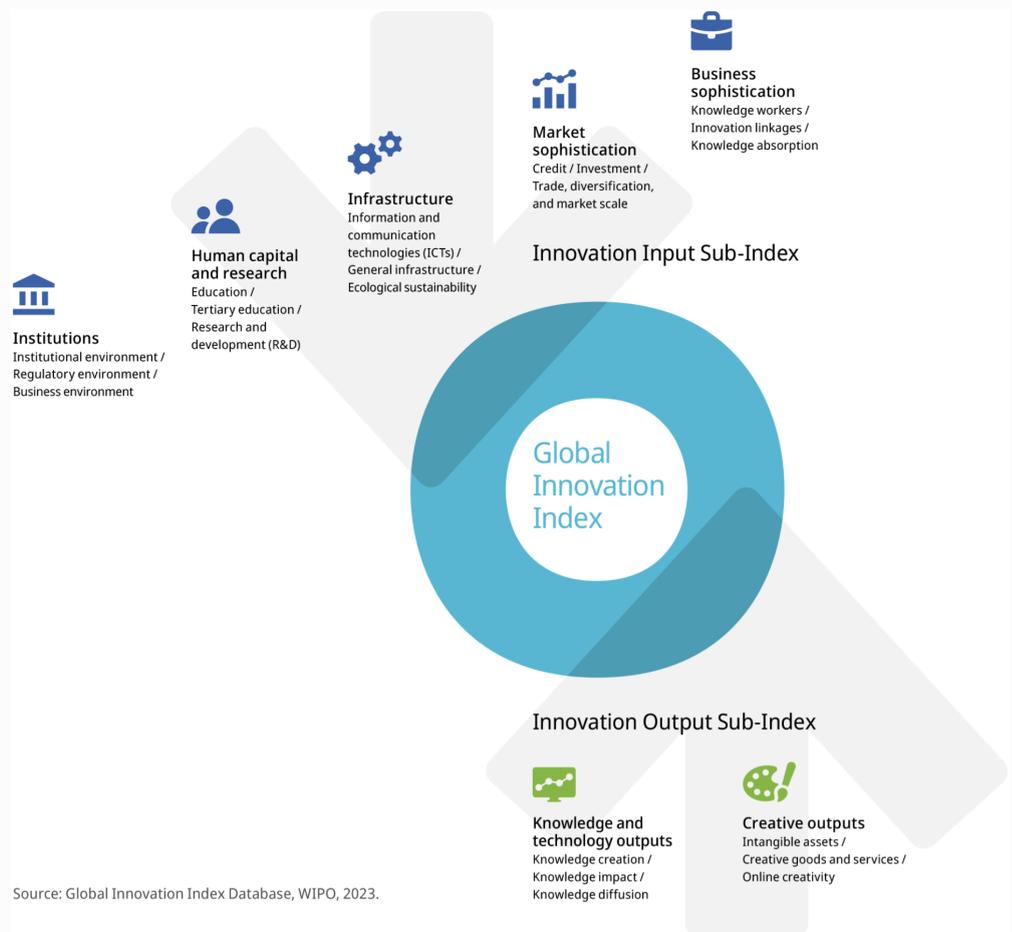
Code	Indicator name	Economy Year	Model Year	Source
1.3.2	Entrepreneurship policies and culture	2019	2022	Global Entrepreneurship Monitor
2.3.1	Researchers, FTE/mn pop.	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
2.3.2	Gross expenditure on R&D, % GDP	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
4.1.1	Finance for startups and scaleups	2019	2022	Global Entrepreneurship Monitor
4.3.2	Domestic industry diversification	2014	2020	United Nations Industrial Development Organization
5.1.2	Firms offering formal training, %	2017	2019	World Bank Enterprise Surveys
5.1.5	Females employed w/advanced degrees, %	2017	2022	International Labour Organization
6.1.1	Patents by origin/bn PPP\$ GDP	2020	2021	World Intellectual Property Organization; International Monetary Fund
6.1.3	Utility models by origin/bn PPP\$ GDP	2020	2021	World Intellectual Property Organization; International Monetary Fund
6.2.4	High-tech manufacturing, %	2014	2020	United Nations Industrial Development Organization
7.1.2	Trademarks by origin/bn PPP\$ GDP	2020	2021	World Intellectual Property Organization; International Monetary Fund
7.1.4	Industrial designs by origin/bn PPP\$ GDP	2020	2021	World Intellectual Property Organization; International Monetary Fund

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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.



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.