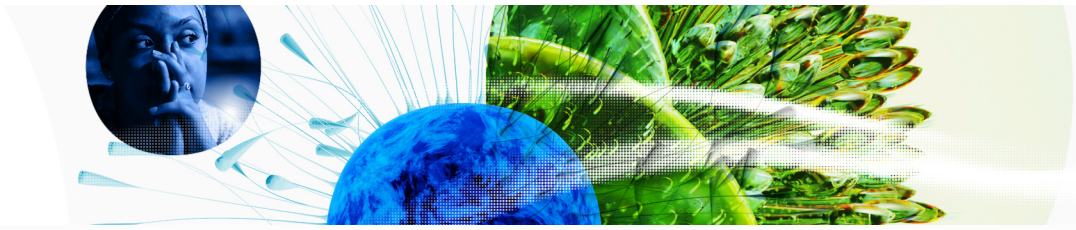
Global Innovation Index 2023



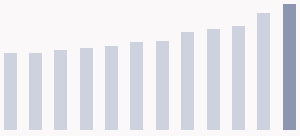
The Global Innovation Index (GII) **ranks world economies according to their innovation capabilities.**

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

Rwanda ranking in the Global Innovation Index 2023

> Rwanda ranks 103rd among the 132 economies featured in the GII 2023.

> Rwanda ranks 1st among the 12 low-income group economies.



> Rwanda ranks 9th among the 28 economies in Sub-Saharan Africa.

> Rwanda GII Ranking (2020-2023)

The table shows the rankings of Rwanda 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 Rwanda in the GII 2023 is between ranks 95 and 110.

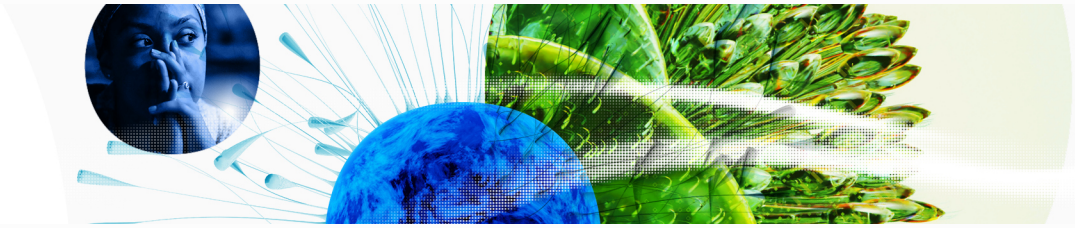
	GII Position	Innovation Inputs	Innovation Outputs
2020	91st	79th	112nd
2021	102nd	91st	108th
2022	105th	91st	123rd
2023	103rd	85th	113rd

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

This year Rwanda ranks 85th in innovation inputs. This position is higher than last year.

Rwanda ranks 113rd in innovation outputs. This position is higher than last year.

Global Innovation Index 2023

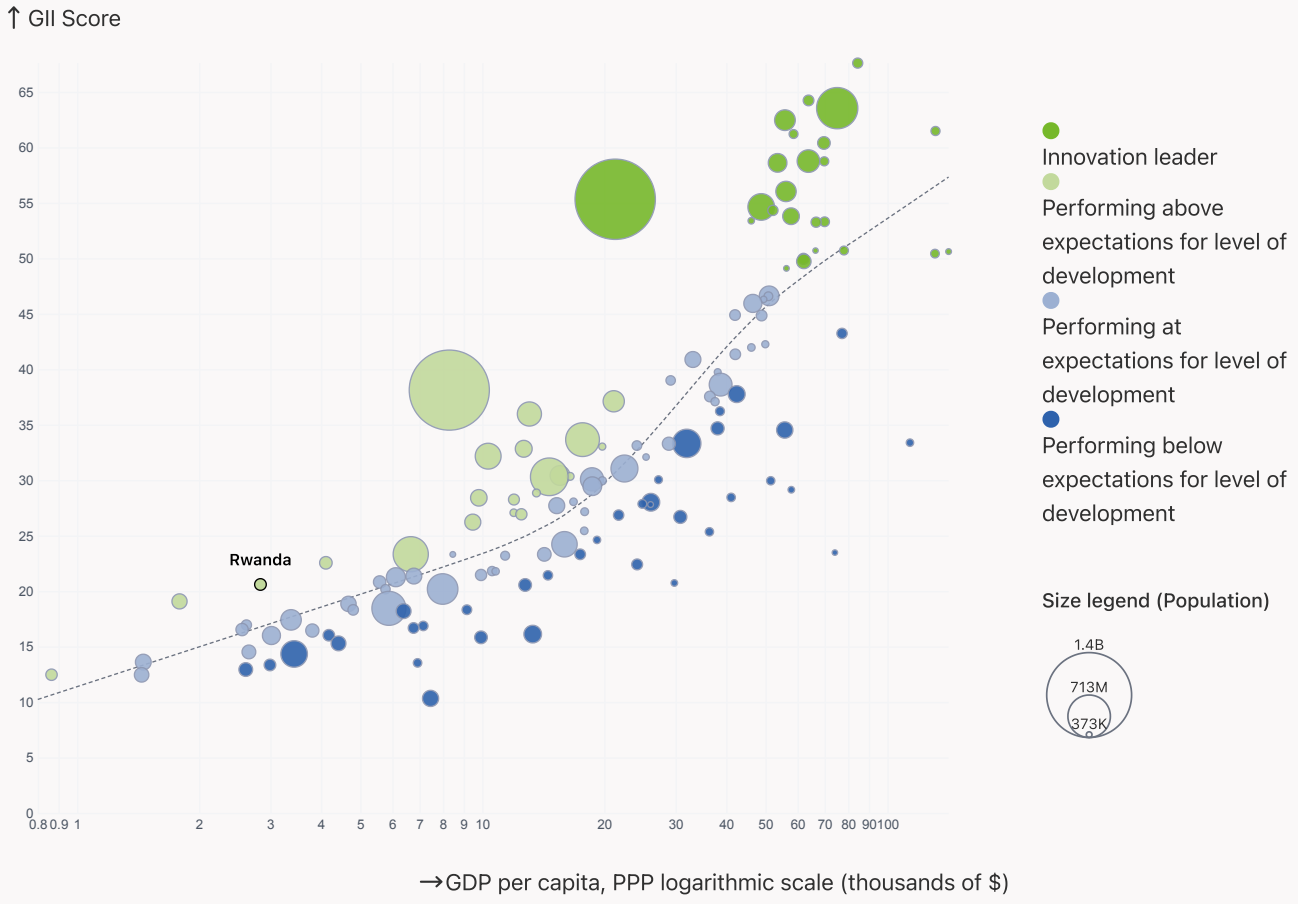


→ Expected vs. observed innovation performance

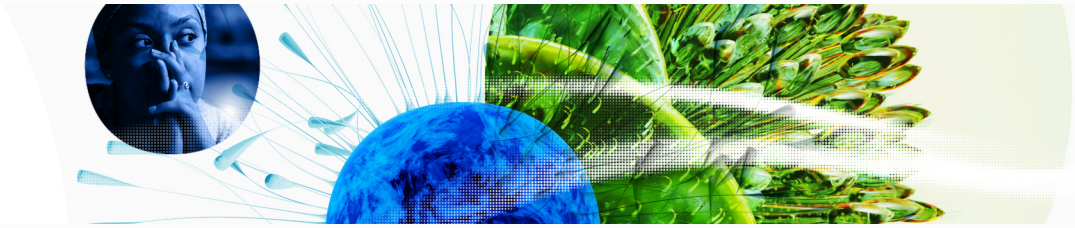
The bubble chart below shows the relationship between income levels (GDP per capita) and innovation performance (GII score). The trend line gives an indication of the expected innovation performance according to income level. Economies appearing above the trend line are performing better than expected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

> Relative to GDP, Rwanda is performing above expectations for its level of development.

> Innovation overperformers relative to their economic development



Global Innovation Index 2023

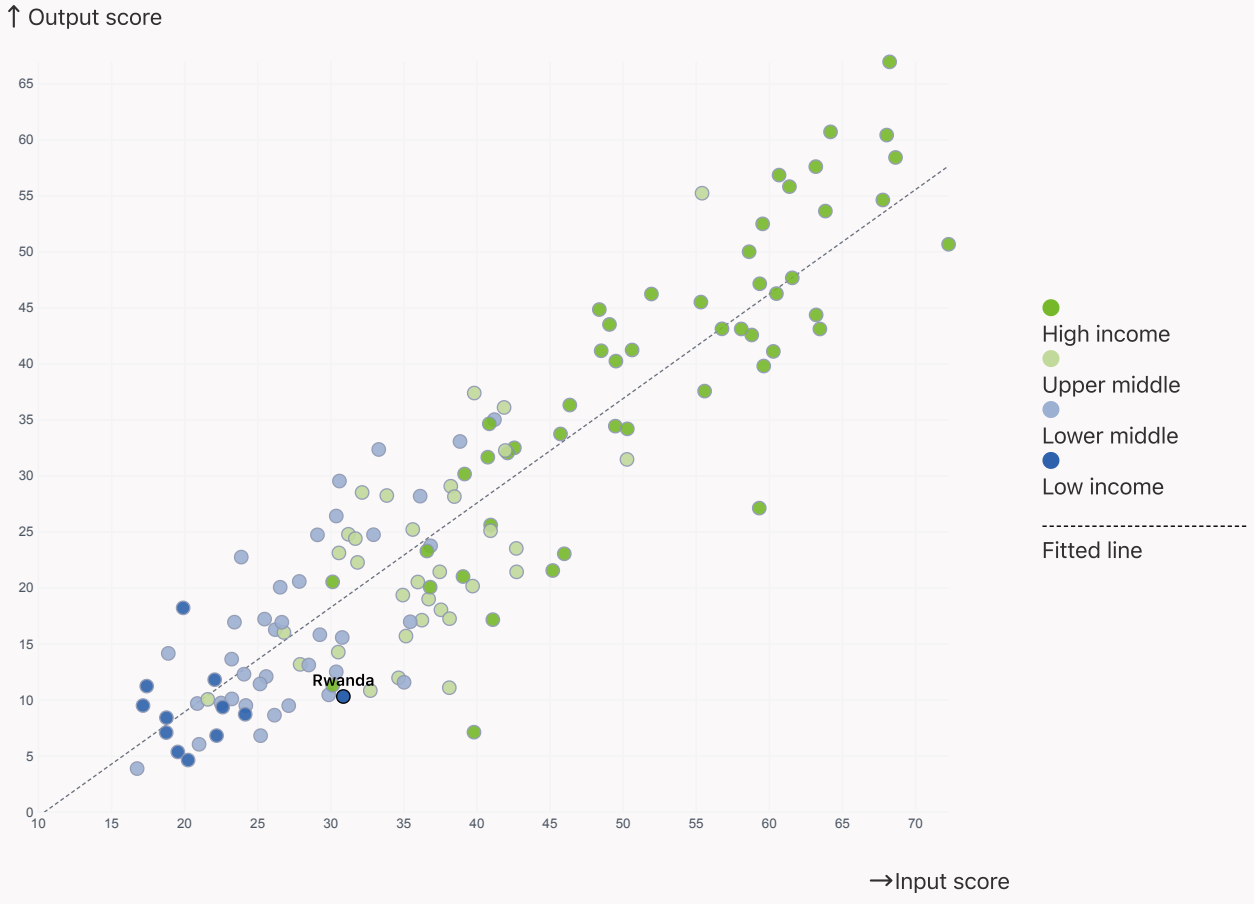


→ Effectively translating innovation investments into innovation outputs

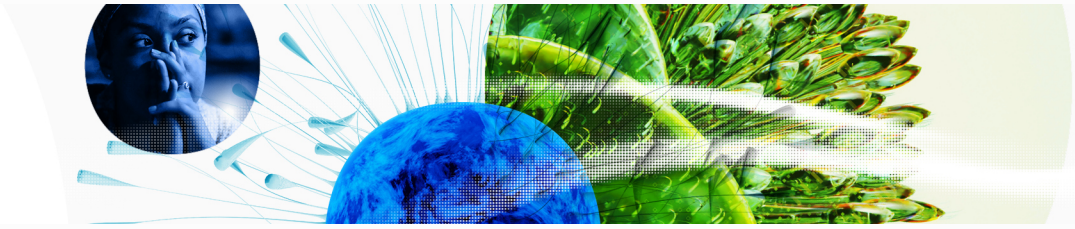
The chart below shows the relationship between innovation inputs and innovation outputs. Economies above the line are effectively translating costly innovation investments into more and higher-quality outputs.

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

> Relationship between innovation inputs and outputs



Global Innovation Index 2023



→ Overview of Rwanda'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 Rwanda are those that rank above the GII (shown in blue) and the weakest are those that rank below.

> Highest rankings

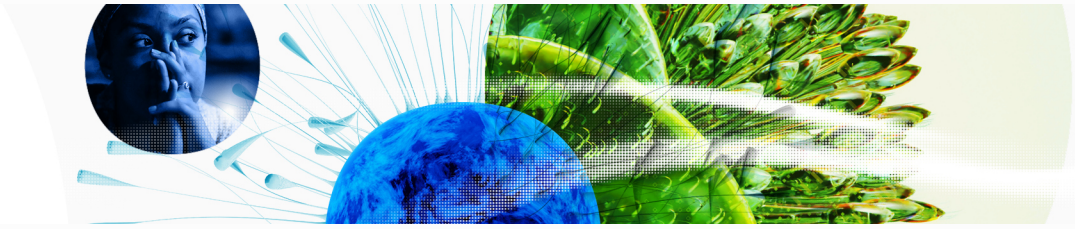
Rwanda ranks highest in Institutions (33rd), Human capital and research (94th), Knowledge and technology outputs (100th) and Infrastructure (101st).

> Lowest rankings

Rwanda ranks lowest in Creative outputs (117th), Market sophistication (115th) and Business sophistication (109th).

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

Global Innovation Index 2023



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

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

> Low-Income economies

Rwanda performs above the low-income group average in Knowledge and technology outputs, Business sophistication, Market sophistication, Human capital and research, Infrastructure, Institutions.

> Sub-Saharan Africa

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

Knowledge and technology outputs

- Top 10 | Score: 58.96
- Rwanda | Score: 13.64
- Sub-Saharan Africa | Score: 12.16
- Low income | Score: 11.03

Creative outputs

- Top 10 | 56.09
- Sub-Saharan Africa | 10.36
- Low income | 7.48
- Rwanda | 6.91

Business sophistication

- Top 10 | 64.39
- Rwanda | 20.03
- Sub-Saharan Africa | 19.85
- Low income | 16.81

Market sophistication

- Top 10 | 61.93
- Sub-Saharan Africa | 20.00
- Rwanda | 18.63
- Low income | 15.67

Human capital and research

- Top 10 | 60.28
- Rwanda | 22.61
- Sub-Saharan Africa | 17.80
- Low income | 15.55

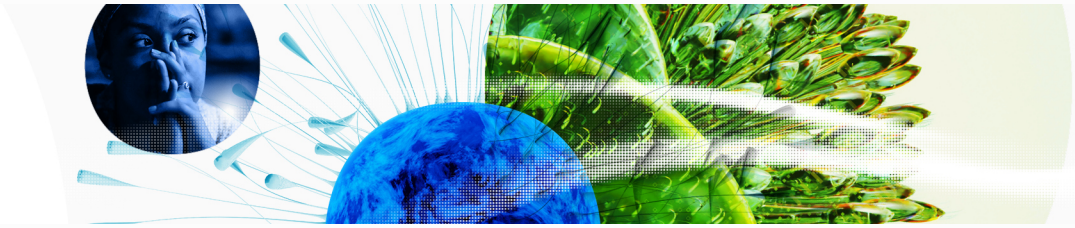
Infrastructure

- Top 10 | 62.83
- Rwanda | 27.85
- Sub-Saharan Africa | 23.36
- Low income | 19.43

Institutions

- Top 10 | 79.85
- Rwanda | 65.39
- Sub-Saharan Africa | 43.27
- Low income | 38.42

Global Innovation Index 2023



→ Innovation strengths and weaknesses in Rwanda

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

> Rwanda's main innovation strengths are **Labor productivity growth, %** (rank 2), **Policies for doing business** (rank 11) and **Graduates in science and engineering, %** (rank 15).

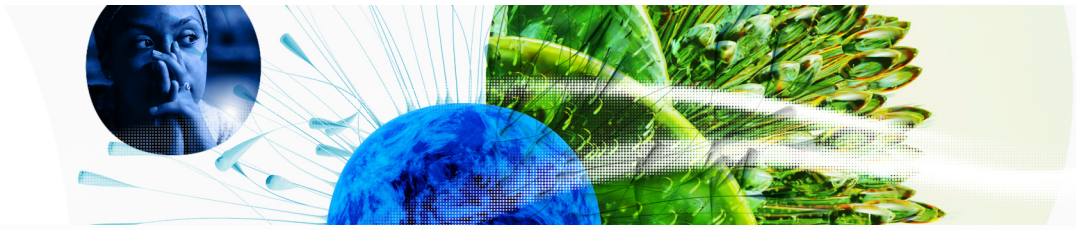
Strengths

Rank	Code	Indicator name
2	6.2.1	Labor productivity growth, %
11	1.3.1	Policies for doing business
15	2.2.2	Graduates in science and engineering, %
18	5.2.3	GERD financed by abroad, % GDP
20	4.2.3	VC recipients, deals/bn PPP$ GDP
22	2.1.2	Government funding/pupil, secondary, % GDP/cap
28	5.3.2	High-tech imports, % total trade
34	5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP
39	1.1.1	Operational stability for businesses
41	3.1.3	Government's online service

Weaknesses

Rank	Code	Indicator name
124	3.2.1	Electricity output, GWh/mn pop.
120	2.2.1	Tertiary enrolment, % gross
116	2.1.5	Pupil-teacher ratio, secondary
103	4.3.2	Domestic industry diversification
101	6.1.2	PCT patents by origin/bn PPP$ GDP
95	5.2.5	Patent families/bn PPP$ GDP
94	5.1.4	GERD financed by business, %
74	7.1.3	Global brand value, top 5,000
71	2.3.4	QS university ranking, top 3
48	6.2.2	Unicorn valuation, % GDP
40	2.3.3	Global corporate R&D investors, top 3, mn US$

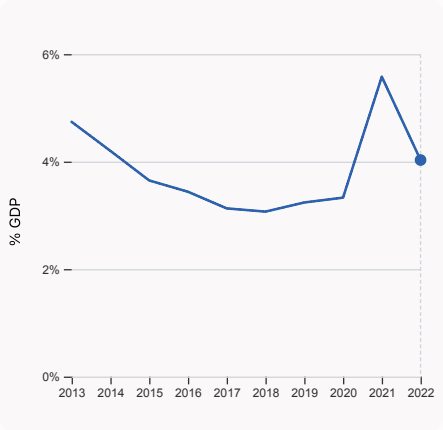
Global Innovation Index 2023



→ Rwanda's innovation system

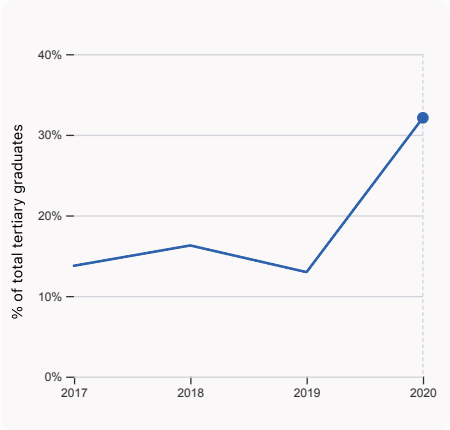
As far as practicable, the plots below present unscaled indicator data.

> Innovation inputs in Rwanda



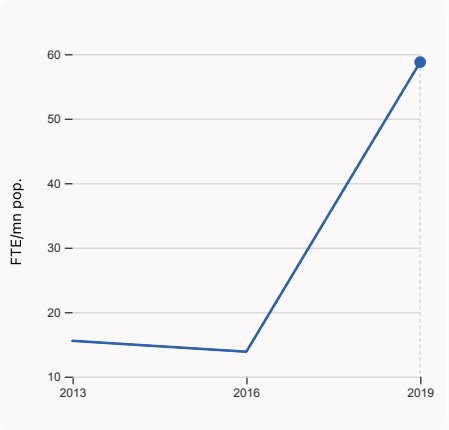
2.1.1 Expenditure on education, % GDP

was equal to 4.03% GDP in 2022, down by 1.55 percentage points from the year prior – and equivalent to an indicator rank of 70.



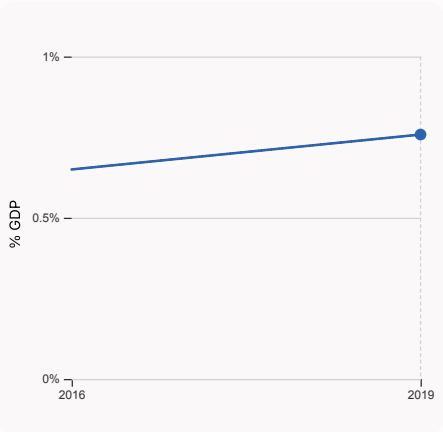
2.2.2 Graduates in science and engineering, %

was equal to 32.1% of total tertiary graduates in 2020, up by 19.14 percentage points from the year prior – and equivalent to an indicator rank of 15.



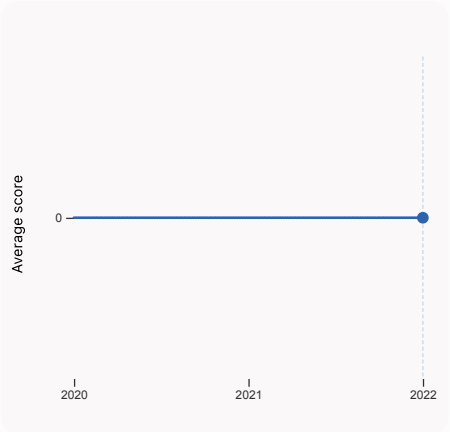
2.3.1 Researchers, FTE/mn pop.

was equal to 58.76 FTE/mn pop. in 2019, up by 323.95% from the year prior – and equivalent to an indicator rank of 94.



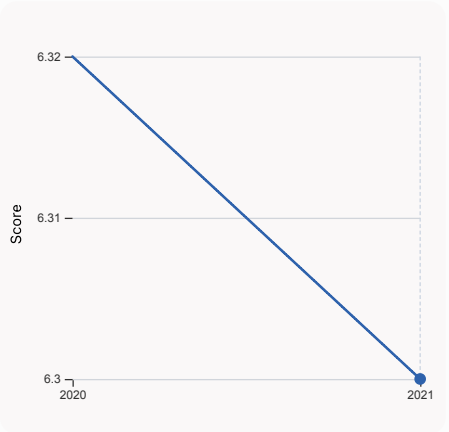
2.3.2 Gross expenditure on R&D, % GDP

was equal to 0.758% GDP in 2019, up by 0.11 percentage points from the year prior – and equivalent to an indicator rank of 48.



2.3.4 QS university ranking, top 3

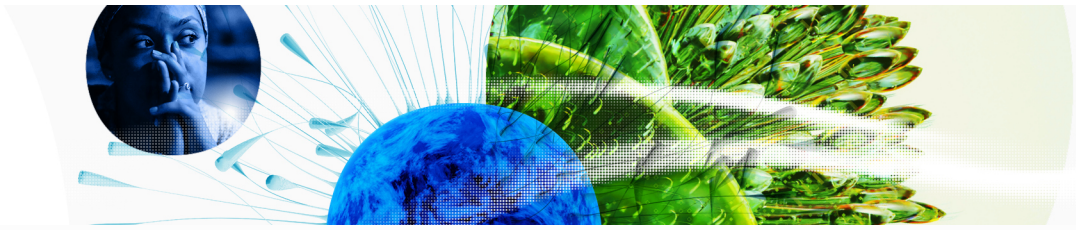
was equal to an average score of 0 for the top 3 universities in 2022, equivalent to an indicator rank of 71.

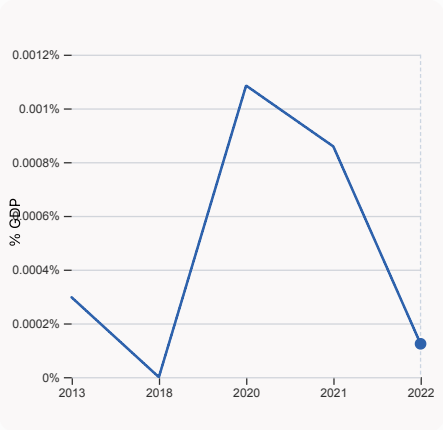


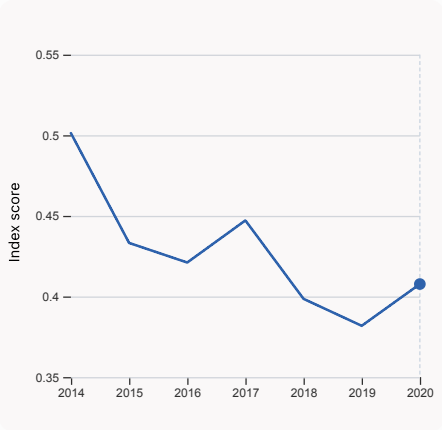
3.1.1 ICT access

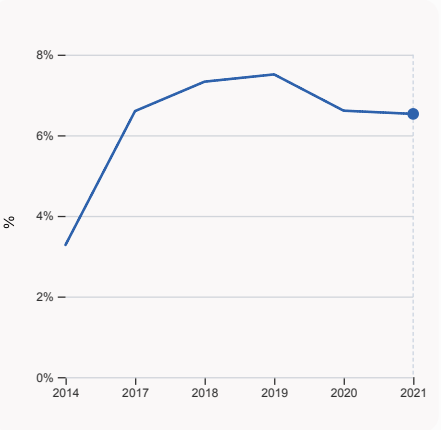
was equal to a score of 6.3 in 2021, down by 0.32% from the year prior – and equivalent to an indicator rank of 115.

Global Innovation Index 2023









4.2.4 VC received, value, % GDP

was equal to 0.00012% GDP in 2022, down by 0.00073 percentage points from the year prior – and equivalent to an indicator rank of 57.

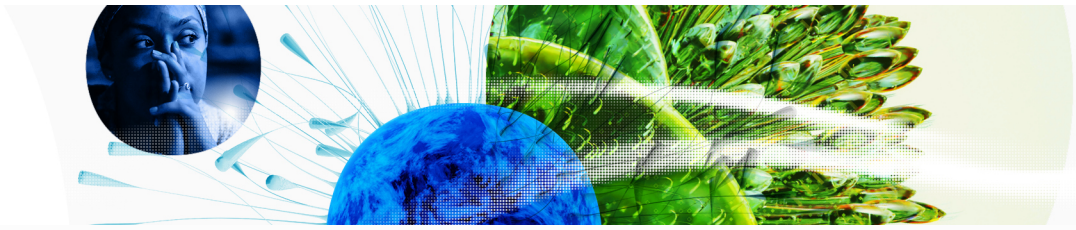
4.3.2 Domestic industry diversification

was equal to an index score of 0.408 in 2020, up by 6.78% from the year prior – and equivalent to an indicator rank of 103.

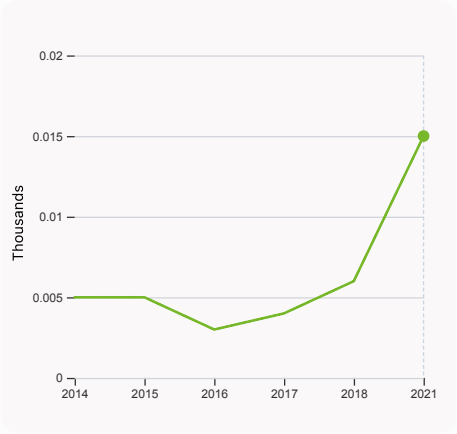
5.1.1 Knowledge-intensive employment, %

was equal to 6.53% in 2021, down by 0.08 percentage points from the year prior – and equivalent to an indicator rank of 116.

Global Innovation Index 2023

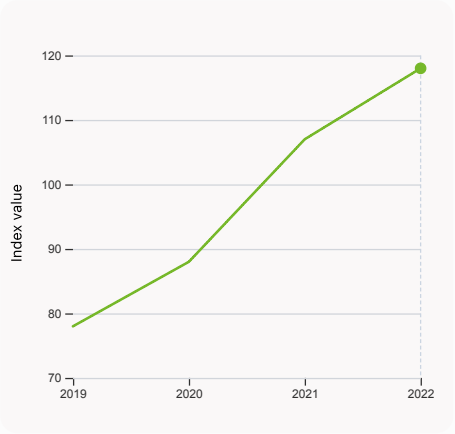


> Innovation outputs in Rwanda



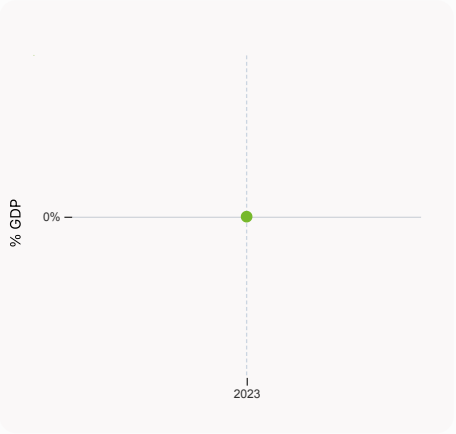
6.1.1 Patents by origin

was equal to 0.015 Thousands in 2021, up by 150% from the year prior – and equivalent to an indicator rank of 82.



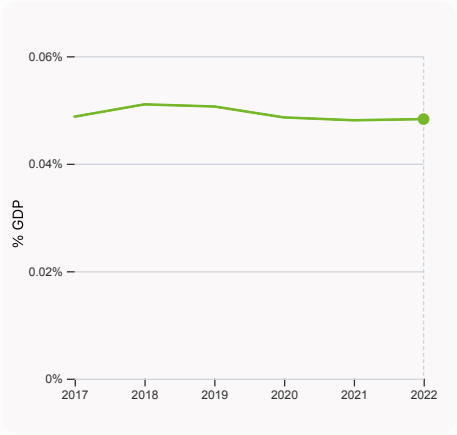
6.1.5 Citable documents H-index

was equal to an index value of 118 in 2022, up by 10.28% from the year prior – and equivalent to an indicator rank of 113.



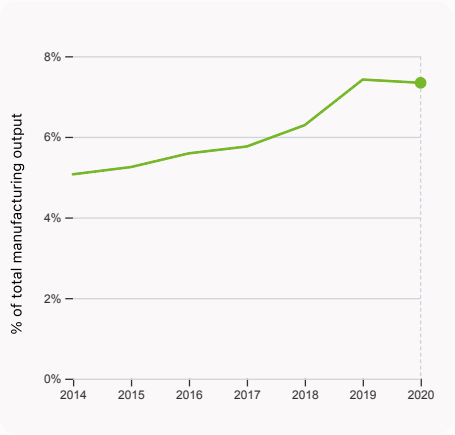
6.2.2 Unicorn valuation, % GDP

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



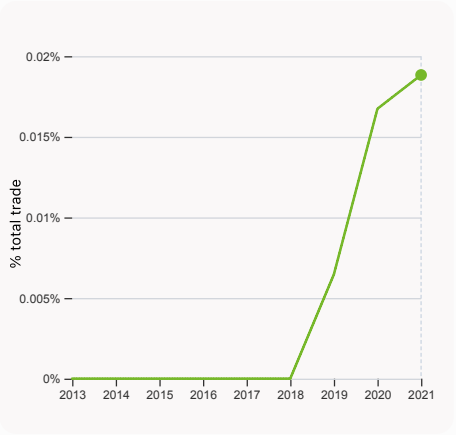
6.2.3 Software spending, % GDP

was equal to 0.048% GDP in 2022, up by 0.00021 percentage points from the year prior – and equivalent to an indicator rank of 106.



6.2.4 High-tech manufacturing, %

was equal to 7.34% of total manufacturing output in 2020, down by 0.08 percentage points from the year prior – and equivalent to an indicator rank of 97.



6.3.1 Intellectual property receipts, % total trade

was equal to 0.019% total trade in 2021, up by 0.0021 percentage points from the year prior – and equivalent to an indicator rank of 92.

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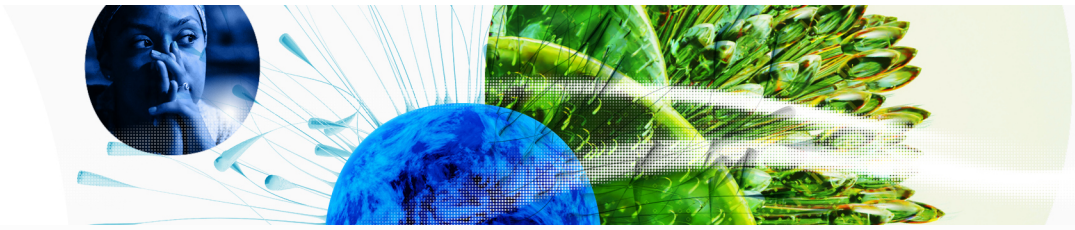
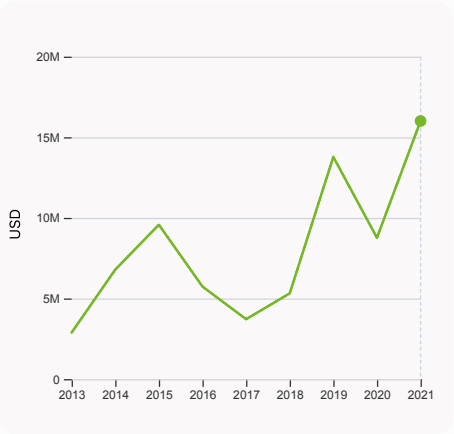
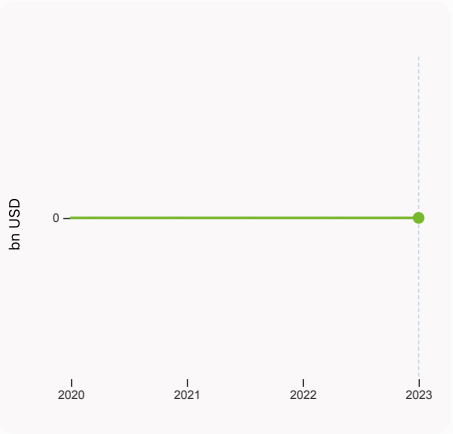




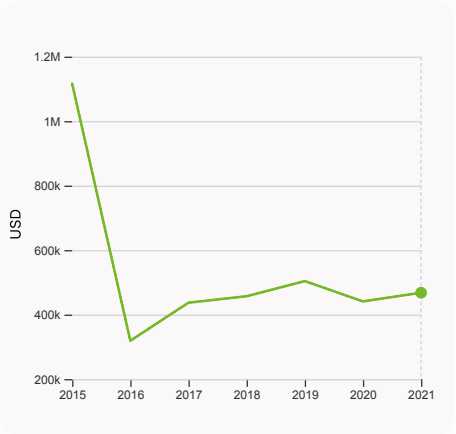
6.3.3 High-tech exports

was equal to 16,010,164 USD in 2021, up by 82.58% from the year prior – and equivalent to an indicator rank of 87.



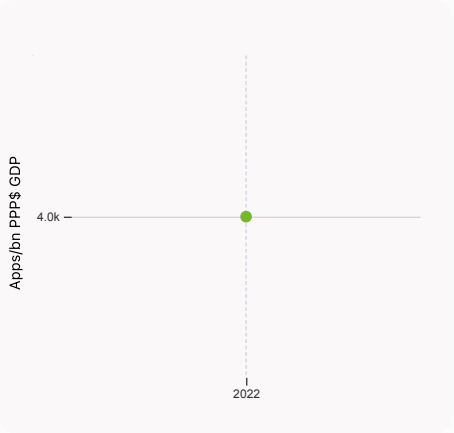
7.1.3 Global brand value, top 5,000

was equal to 0 bn USD in 2023 – and equivalent to an indicator rank of 74.



7.2.1 Cultural and creative services exports

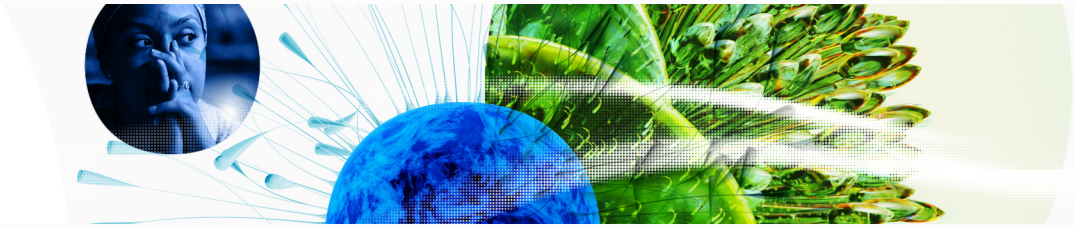
was equal to 468,000 USD in 2021, up by 6.12% from the year prior – and equivalent to an indicator rank of 99.



7.3.4 Mobile app creation/bn PPP$ GDP

was equal to 4,022.24 Apps/bn PPP$ GDP in 2022 – and equivalent to an indicator rank of 108.

Global Innovation Index 2023



Rwanda

GII 2023 rank
103

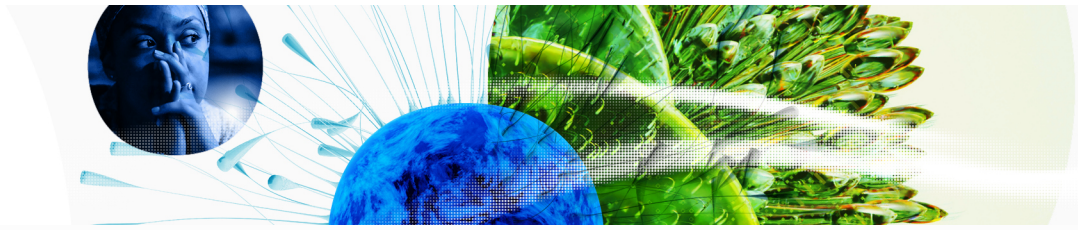
Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
113	85	Low	SSA	13.8	37.6	2,835.8

	Score / Value	Rank	
Institutions	**65.4**	**33**	
1.1 Institutional environment	**53.9**	**47**	
1.1.1 Operational stability for businesses*	63.9	39	●
1.1.2 Government effectiveness*	44.0	55	
1.2 Regulatory environment	**63.2**	**66**	
1.2.1 Regulatory quality*	43.9	70	
1.2.2 Rule of law*	45.6	56	
1.2.3 Cost of redundancy dismissal	17.3	70	
1.3 Business environment	**79.1**	**8**	
1.3.1 Policies for doing business†	79.1	11	●
1.3.2 Entrepreneurship policies and culture†	n/a	n/a	
Human capital and research	**22.6**	**94**	
2.1 Education	**37.7**	**106**	
2.1.1 Expenditure on education, % GDP	4.0	70	
2.1.2 Government funding/pupil, secondary, % GDP/cap	24.8	22	●
2.1.3 School life expectancy, years	11.2	97	
2.1.4 PISA scales in reading, maths and science	n/a	n/a	
2.1.5 Pupil-teacher ratio, secondary	27.4	116	○
2.2 Tertiary education	**26.6**	**75**	
2.2.1 Tertiary enrolment, % gross	7.3	120	○
2.2.2 Graduates in science and engineering, %	32.1	15	●
2.2.3 Tertiary inbound mobility, %	4.2	55	
2.3 Research and development (R&D)	**3.5**	**85**	
2.3.1 Researchers, FTE/mn pop.	58.8	94	
2.3.2 Gross expenditure on R&D, % GDP	0.8	48	
2.3.3 Global corporate R&D investors, top 3, mn US$	0.0	40	○ ◇
2.3.4 QS university ranking, top 3*	0.0	71	○ ◇
Infrastructure	**27.9**	**101**	
3.1 Information and communication technologies (ICTs)	**53.7**	**93**	
3.1.1 ICT access*	44.1	115	
3.1.2 ICT use*	30.6	115	
3.1.3 Government's online service*	77.2	41	●
3.1.4 E-participation*	62.8	53	
3.2 General infrastructure	**18.3**	**99**	
3.2.1 Electricity output, GWh/mn pop.	67.2	124	○
3.2.2 Logistics performance*	31.8	71	
3.2.3 Gross capital formation, % GDP	25.8	46	
3.3 Ecological sustainability	**11.6**	**121**	
3.3.1 GDP/unit of energy use	5.5	112	
3.3.2 Environmental performance*	23.6	100	
3.3.3 ISO 14001 environment/bn PPP$ GDP	0.2	109	
Market sophistication	**18.6**	**115**	
4.1 Credit	**8.1**	**118**	
4.1.1 Finance for startups and scaleups†	n/a	n/a	
4.1.2 Domestic credit to private sector, % GDP	25.0	110	
4.1.3 Loans from microfinance institutions, % GDP	0.7	33	
4.2 Investment	**18.0**	**39**	
4.2.1 Market capitalization, % GDP	31.0	46	
4.2.2 Venture capital (VC) investors, deals/bn PPP$ GDP	n/a	n/a	
4.2.3 VC recipients, deals/bn PPP$ GDP	0.1	20	●
4.2.4 VC received, value, % GDP	0.0	57	
4.3 Trade, diversification, and market scale	**29.7**	**116**	
4.3.1 Applied tariff rate, weighted avg., %	10.2	119	
4.3.2 Domestic industry diversification	54.4	103	○
4.3.3 Domestic market scale, bn PPP$	37.6	121	

	Score / Value	Rank	
Business sophistication	**20.0**	**109**	
5.1 Knowledge workers	**12.1**	**115**	
5.1.1 Knowledge-intensive employment, %	6.5	116	
5.1.2 Firms offering formal training, %	35.9	43	
5.1.3 GERD performed by business, % GDP	0.0	73	
5.1.4 GERD financed by business, %	0.6	94	○
5.1.5 Females employed w/advanced degrees, %	3.3	100	
5.2 Innovation linkages	**24.9**	**55**	
5.2.1 University-industry R&D collaboration†	35.9	82	
5.2.2 State of cluster development†	39.5	72	
5.2.3 GERD financed by abroad, % GDP	0.2	18	●
5.2.4 Joint venture/strategic alliance deals/bn PPP$ GDP	0.0	34	●
5.2.5 Patent families/bn PPP$ GDP	0.0	95	○ ◇
5.3 Knowledge absorption	**23.0**	**114**	
5.3.1 Intellectual property payments, % total trade	0.0	115	
5.3.2 High-tech imports, % total trade	10.9	28	●
5.3.3 ICT services imports, % total trade	0.7	95	
5.3.4 FDI net inflows, % GDP	2.0	71	
5.3.5 Research talent, % in businesses	5.6	68	
Knowledge and technology outputs	**13.6**	**100**	
6.1 Knowledge creation	**8.2**	**92**	
6.1.1 Patents by origin/bn PPP$ GDP	0.5	82	
6.1.2 PCT patents by origin/bn PPP$ GDP	0.0	101	○ ◇
6.1.3 Utility models by origin/bn PPP$ GDP	0.1	61	
6.1.4 Scientific and technical articles/bn PPP$ GDP	n/a	n/a	
6.1.5 Citable documents H-index	4.2	113	
6.2 Knowledge impact	**27.7**	**61**	
6.2.1 Labor productivity growth, %	6.0	2	●
6.2.2 Unicorn valuation, % GDP	0.0	48	○ ◇
6.2.3 Software spending, % GDP	0.0	106	
6.2.4 High-tech manufacturing, %	7.3	97	
6.3 Knowledge diffusion	**5.1**	**126**	
6.3.1 Intellectual property receipts, % total trade	0.0	92	
6.3.2 Production and export complexity	n/a	n/a	
6.3.3 High-tech exports, % total trade	0.6	87	
6.3.4 ICT services exports, % total trade	1.0	88	
6.3.5 ISO 9001 quality/bn PPP$ GDP	0.5	118	
Creative outputs	**6.9**	**117**	
7.1 Intangible assets	**7.0**	**114**	
7.1.1 Intangible asset intensity, top 15, %	n/a	n/a	
7.1.2 Trademarks by origin/bn PPP$ GDP	20.6	92	
7.1.3 Global brand value, top 5,000	0.0	74	○ ◇
7.1.4 Industrial designs by origin/bn PPP$ GDP	0.3	95	
7.2 Creative goods and services	**1.5**	**110**	
7.2.1 Cultural and creative services exports, % total trade	0.0	99	
7.2.2 National feature films/mn pop. 15-69	n/a	n/a	
7.2.3 Entertainment and media market/th pop. 15-69	n/a	n/a	
7.2.4 Creative goods exports, % total trade	0.2	75	
7.3 Online creativity	**12.2**	**109**	
7.3.1 Generic top-level domains (TLDs)/th pop. 15-69	0.2	121	
7.3.2 Country-code TLDs/th pop. 15-69	0.2	115	
7.3.3 GitHub commits/mn pop. 15-69	2.7	93	
7.3.4 Mobile app creation/bn PPP$ GDP	45.7	108	

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.

Global Innovation Index 2023



→ Data availability

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

> Rwanda has missing data for eight indicators and outdated data for eleven indicators.

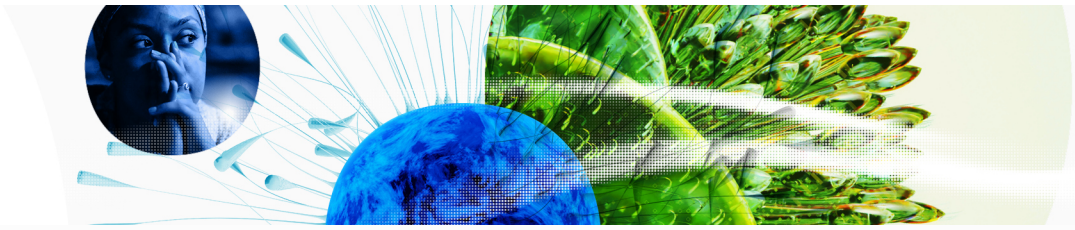
> Missing data for Rwanda

Code	Indicator name	Economy Year	Model Year	Source
1.3.2	Entrepreneurship policies and culture	n/a	2022	Global Entrepreneurship Monitor
2.1.4	PISA scales in reading, maths and science	n/a	2018	OECD, PISA
4.1.1	Finance for startups and scaleups	n/a	2022	Global Entrepreneurship Monitor
4.2.2	Venture capital (VC) investors, deals/bn PPP$ GDP	n/a	2022	Refinitiv; International Monetary Fund
6.3.2	Production and export complexity	n/a	2020	Harvard University, Growth Lab
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 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 Rwanda

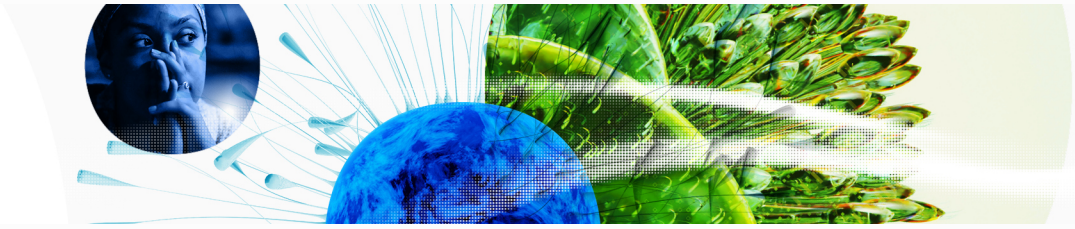
Code	Indicator name	Economy Year	Model Year	Source
2.1.3	School life expectancy, years	2019	2020	UNESCO Institute for Statistics
2.3.1	Researchers, FTE/mn pop.	2019	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
2.3.2	Gross expenditure on R&D, % GDP	2019	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
3.2.1	Electricity output, GWh/mn pop.	2020	2021	International Energy Agency
4.2.1	Market capitalization, % GDP	2019	2020	World Federation of Exchanges; World Bank
5.1.1	Knowledge-intensive employment, %	2021	2022	International Labour Organization
5.1.3	GERD performed by business, % GDP	2016	2021	UNESCO Institute for Statistics; Eurostat; OECD;

Global Innovation Index 2023



Code	Indicator name	Economy Year	Model Year	Source
				RICYT
5.1.4	GERD financed by business, %	2016	2020	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
5.1.5	Females employed w/advanced degrees, %	2021	2022	International Labour Organization
5.2.3	GERD financed by abroad, % GDP	2016	2020	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
5.3.5	Research talent, % in businesses	2016	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT

Global Innovation Index 2023



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.