GLOBAL INNOVATION INDEX 2019

RWANDA

94th Rwanda ranks 94th 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 Rwanda 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 Rwanda's ranking in the GII 2019 is between 89 and 121.

Rwanda's Rankings, 2017 - 2019

	GII	Innovation Inputs	Innovation Outputs
2019	94	65	123
2018	99	73	120
2017	99	76	121

- Rwanda performs better in Innovation Inputs than Outputs.
- This year Rwanda ranks 65th in Innovation Inputs, better than last year and compared to 2017.
- As for Innovation Outputs, Rwanda ranks 123rd. This position is worse than last year and compared to 2017.

1st Rwanda ranks 1st among the 19 low-income economies.

5th Rwanda ranks 5th among the 26 economies in Sub-Saharan Africa.

Rwanda becomes the top low-income economy this year, gaining five positions since last year. Between 2018 and 2019, the rank increase for Rwanda is a mix of improved performance and new innovation data becoming available (pages 9 and 10).

Rwanda improves in four of the seven GII areas this year, and most notably in indicators such as Ease of starting a business, Tertiary inbound mobility, Government's online service, Knowledge-intensive employment, Utility models by origin, and Creative goods exports.

It ranks in the top 10 in Government's funding per pupil, Ease of getting credit, and Microfinance loans. Other relative strengths in the Rwanda's GII profile include Government effectiveness, Ease of protecting minority investors, and Firms offering formal training (pages 6 and 7).

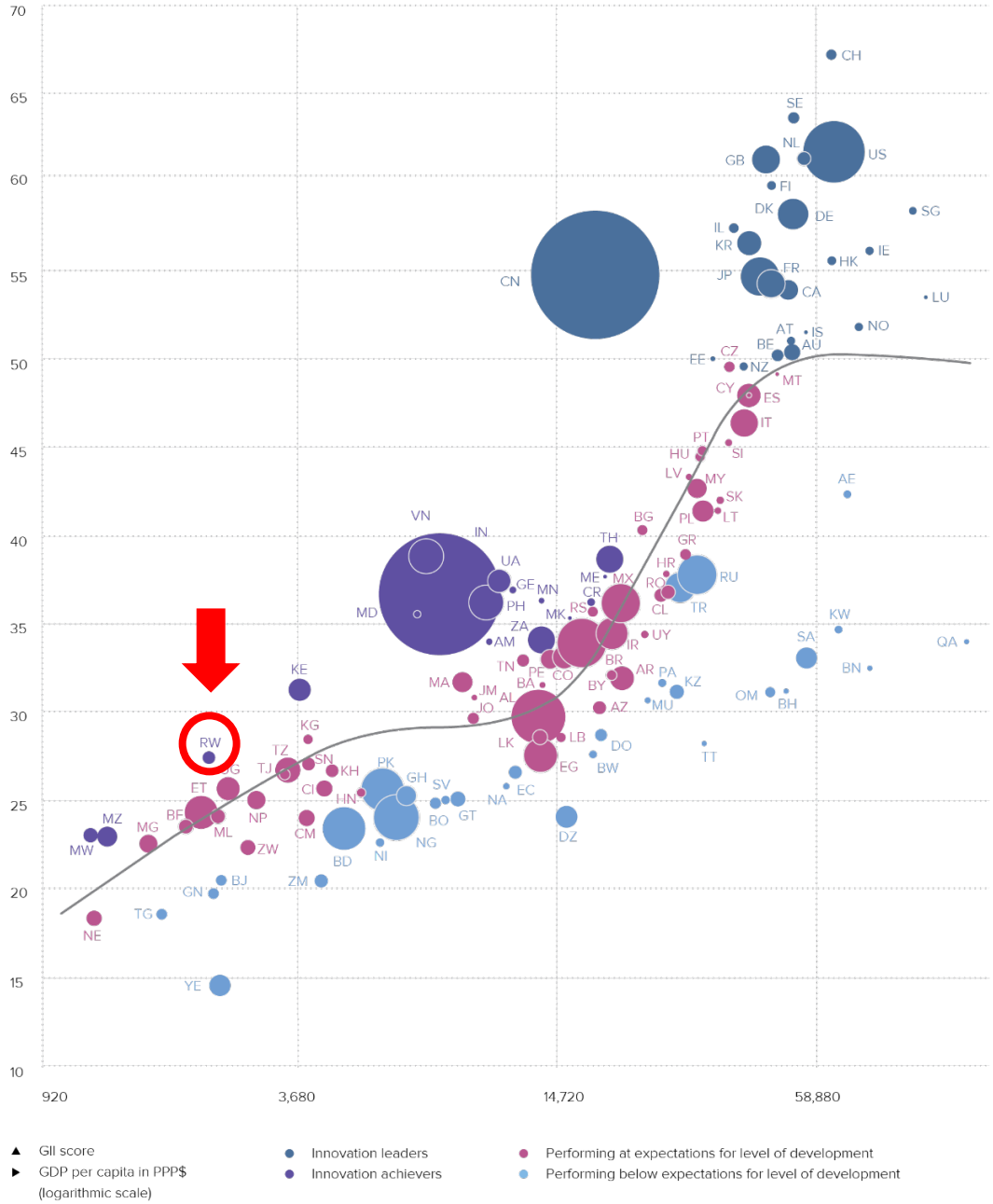
A number of areas for further improvement remain and include several indicators related to the human capital and research system, and in particular indicators Tertiary enrolment, Researchers, Global R&D companies, and Quality of universities (pages 6 and 7).

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, Rwanda performs above its expected level of development.

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

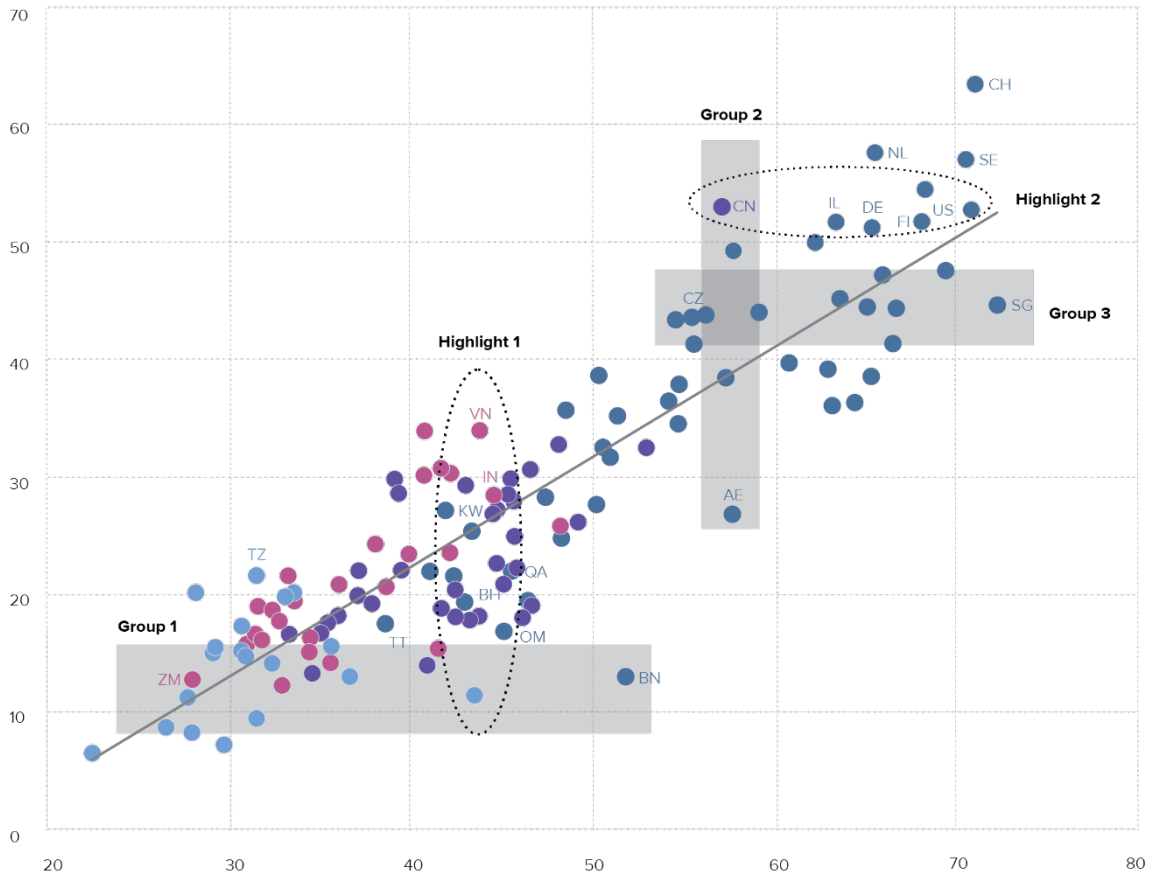


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

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

Innovation input/output performance by income group, 2019



▲ Output score
▶ Input score

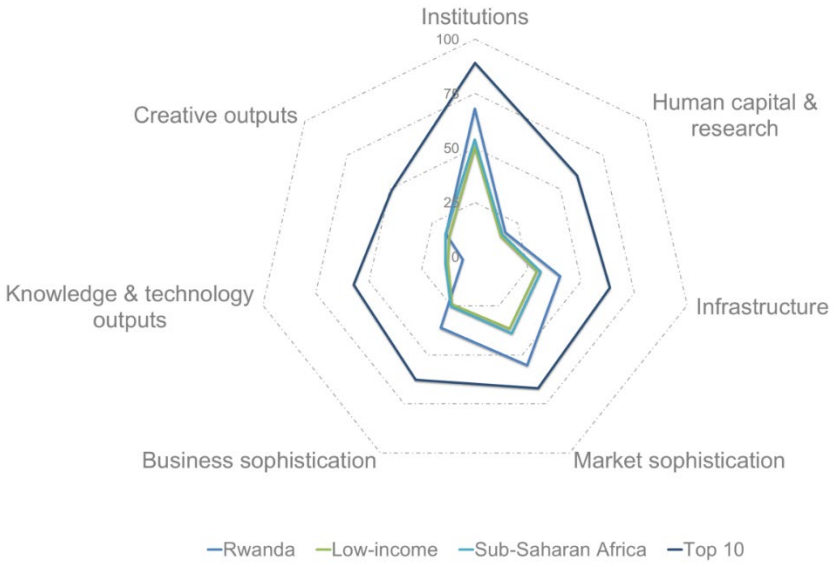
● High income
● Upper-middle income
● Lower-middle income
● Low income

— 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 RWANDA TO OTHER LOW-INCOME ECONOMIES AND THE SUB-SAHARAN AFRICA REGION

Rwanda's scores in the seven GII pillars



Low-income economies

Rwanda has high scores in six out of the seven GII pillars: Institutions, Human capital & research, Infrastructure, Market sophistication, Business sophistication, and Creative outputs, which are above the average of the low-income group.

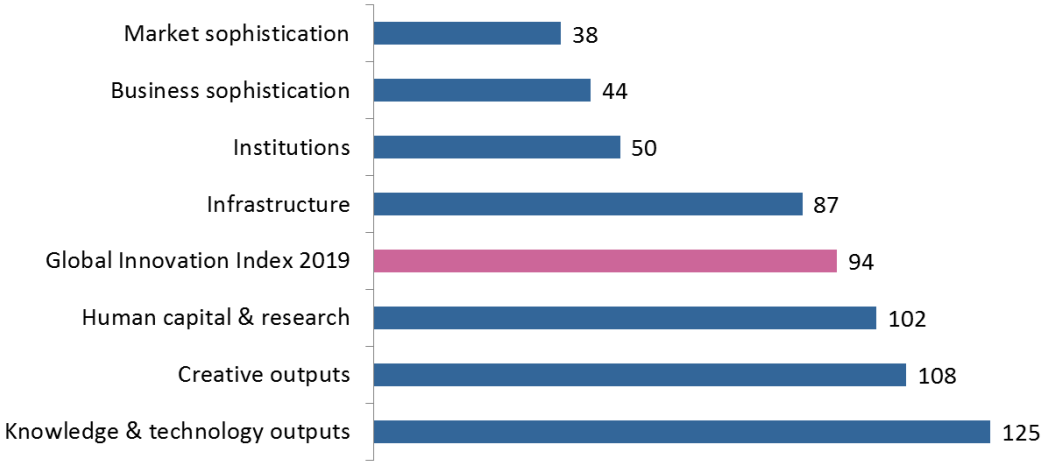
Sub-Saharan Africa Region

Compared to other economies in the Sub-Saharan Africa region, Rwanda performs above average in five out of the seven GII pillars: Institutions, Human capital & research, Infrastructure, Market sophistication, and Business sophistication.

Top ranks are found in all sub-pillars within Institutions - Political environment, Regulatory environment, and Business environment – as well as in General infrastructure, Credit, Investment, and Innovation linkages where the country ranks in the top 60 worldwide.

OVERVIEW OF RWANDA'S RANKINGS IN THE 7 GII AREAS

Rwanda performs the best in Market sophistication and its weakest performance is in Knowledge & technology outputs.



*The highest possible ranking in each pillar is 1.

RWANDA'S INNOVATION STRENGTHS AND WEAKNESSES

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

Strengths

Code	Indicator name	Rank
1	Institutions	50
1.1	Political environment	51
1.1.2	Government effectiveness*	53
1.2	Regulatory environment	51
1.2.3	Cost of redundancy dismissal, salary weeks	40
1.3	Business environment	52
1.3.1	Ease of starting a business*	45
1.3.2	Ease of resolving insolvency*	53
2.1.2	Government funding/pupil, secondary, % GDP/cap	4
3.2	General infrastructure	40
3.2.3	Gross capital formation, % GDP	46
4	Market sophistication	38
4.1	Credit	16
4.1.1	Ease of getting credit*	3
4.1.3	Microfinance gross loans, % GDP	1
4.2	Investment	31
4.2.1	Ease of protecting minority investors*	13
5.1.2	Firms offering formal training, % firms	12
5.3.2	High-tech imports, % total trade	35

Weaknesses

Code	Indicator name	Rank
2.2.1	Tertiary enrolment, % gross	113
2.3	Research & development (R&D)	120
2.3.1	Researchers, FTE/mn pop.	105
2.3.3	Global R&D companies, top 3, in mn US$	43
2.3.4	QS university ranking, average score top 3*	78
3.1.1	ICT access*	119
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	128
4.3	Trade, competition, & market scale	120
4.3.3	Domestic market scale, bn PPP$	119
6	Knowledge & technology outputs	125
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	122
7.3	Online creativity	123
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	120
7.3.3	Wikipedia edits/mn pop. 15–69	117

STRENGTHS

- GII strengths for Rwanda are found in five of the seven GII pillars.
- All these strengths are concentrated on the innovation input side of the GII which captures the investments that countries make to produce more and higher-quality innovations.
- Pillars Institutions (50) and Market sophistication (38) are relative strengths for Rwanda.
- In Institutions (50), additional strengths are all of its three sub-pillars - Political environment (51), Regulatory environment (51), and Business environment (52) - and four indicators: Government effectiveness (53), Cost of redundancy dismissal (40), Ease of starting a business (45), and Ease of resolving insolvency (53).
- Several other relative strengths for Rwanda are in Market sophistication (38). Here, the country has GII strengths in two sub-pillars - Credit (16) and Investment (31) – and in indicators Ease of protecting minority investors (13), Ease of getting credit (3), and Microfinance gross loans, where Rwanda ranks 1st worldwide.
- The other strengths for Rwanda are scattered across the other three input pillars as follows:
    - In Human capital & research (102), Rwanda's strength is indicator Government funding per pupil, where it places 4th worldwide.
    - In Infrastructure (87), sub-pillar General infrastructure (40) and indicator Gross capital formation (46) are GII strengths for Rwanda.
    - In Business sophistication (44), relative strengths are indicators Firms offering formal training (12) and High-tech imports (35).

WEAKNESSES

- Rwanda's weaknesses in the GII are found in five of the seven GII pillars.
- Several of these weaknesses are in Human capital & research (102). Here the country's weaknesses are sub-pillar Research & development (R&D) (120) and indicators Tertiary enrolment (113), Researchers (105), Global R&D companies (43), and Quality of universities (78).
- In Infrastructure (87), Rwanda's weaknesses are indicators ICT access (119) and ISO 14001 environmental certificates (128).
- In Market sophistication (38), sub-pillar Trade, competition, & market scale (120) and indicator Domestic market scale (119) are relative weaknesses for Rwanda.
- In Knowledge & technology outputs (125), Rwanda present one weakness in indicator ISO 9001 quality certificates (122).
- In Creative outputs (108), sub-pillar Online creativity (123) and indicators Generic top-level domains (TLDs) (120) and Wikipedia edit (117) are relative weaknesses for this country.

RWANDA

GII 2019 rank

94

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$	GDP per capita, PPP$	GII 2018 rank
123	**65**	**Low**	**SSF**	**12.5**	**27.1**	**2,280.1**	**99**

		Score/Value	Rank	
INSTITUTIONS		**68.1**	**50**	● ◆
1.1	**Political environment**	**59.8**	**51**	● ◆
1.1.1	Political and operational stability*	73.7	50	◆
1.1.2	Government effectiveness*	52.9	53	● ◆
1.2	**Regulatory environment**	**70.1**	**51**	● ◆
1.2.1	Regulatory quality*	45.9	63	◆
1.2.2	Rule of law*	49.8	54	◆
1.2.3	Cost of redundancy dismissal, salary weeks	13.0	40	●
1.3	**Business environment**	**74.3**	**52**	● ◆
1.3.1	Ease of starting a business*	91.4	45	●
1.3.2	Ease of resolving insolvency*	57.2	53	● ◆
HUMAN CAPITAL & RESEARCH		**17.8**	**102**	
2.1	**Education**	**43.9**	**74**	◆
2.1.1	Expenditure on education, % GDP	3.2	97	
2.1.2	Government funding/pupil, secondary, % GDP/cap	38.0	4	● ◆
2.1.3	School life expectancy, years	11.2	99	
2.1.4	PISA scales in reading, maths, & science	n/a	n/a	
2.1.5	Pupil-teacher ratio, secondary	20.1	89	
2.2	**Tertiary education**	**9.5**	**112**	
2.2.1	Tertiary enrolment, % gross	7.6	113	○
2.2.2	Graduates in science & engineering, %	13.8	92	
2.2.3	Tertiary inbound mobility, %	1.7	78	
2.3	**Research & development (R&D)**	**0.0**	**120**	○ ◇
2.3.1	Researchers, FTE/mn pop. 🕘	12.3	105	○ ◇
2.3.2	Gross expenditure on R&D, % GDP	n/a	n/a	
2.3.3	Global R&D companies, avg. exp. top 3, mn US$	0.0	43	○ ◇
2.3.4	QS university ranking, average score top 3*	0.0	78	○ ◇
INFRASTRUCTURE		**40.0**	**87**	◆
3.1	**Information & communication technologies(ICTs)**	**48.7**	**99**	◆
3.1.1	ICT access*	27.8	119	○
3.1.2	ICT use*	19.0	110	
3.1.3	Government's online service*	72.2	67	◆
3.1.4	E-participation*	75.8	59	◆
3.2	**General infrastructure**	**42.0**	**40**	●
3.2.1	Electricity output, kWh/mn pop	n/a	n/a	
3.2.2	Logistics performance*	42.6	56	◆
3.2.3	Gross capital formation, % GDP	25.0	46	●
3.3	**Ecological sustainability**	**29.1**	**102**	
3.3.1	GDP/unit of energy use	n/a	n/a	
3.3.2	Environmental performance*	43.7	113	
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	0.0	128	○ ◇
MARKET SOPHISTICATION		**55.2**	**38**	● ◆
4.1	**Credit**	**67.6**	**16**	● ◆
4.1.1	Ease of getting credit*	95.0	3	● ◆
4.1.2	Domestic credit to private sector, % GDP	20.9	111	
4.1.3	Microfinance gross loans, % GDP	6.7	1	● ◆
4.2	**Investment**	**54.2**	**31**	● ◆
4.2.1	Ease of protecting minority investors*	76.7	13	● ◆
4.2.2	Market capitalization, % GDP	n/a	n/a	
4.2.3	Venture capital deals/bn PPP$ GDP	0.0	35	
4.3	**Trade, competition, & market scale**	**44.0**	**120**	○
4.3.1	Applied tariff rate, weighted avg., % 🕘	7.3	99	
4.3.2	Intensity of local competition†	57.9	114	
4.3.3	Domestic market scale, bn PPP$	27.1	119	○

		Score/Value	Rank	
BUSINESS SOPHISTICATION		**36.2**	**[44]**	
5.1	**Knowledge workers**	**34.8**	**[69]**	
5.1.1	Knowledge-intensive employment, %	8.2	103	
5.1.2	Firms offering formal training, % firms 🕘	55.4	12	● ◆
5.1.3	GERD performed by business, % GDP	n/a	n/a	
5.1.4	GERD financed by business, %	n/a	n/a	
5.1.5	Females employed w/advanced degrees, %	3.7	94	◆
5.2	**Innovation linkages**	**44.4**	**[23]**	
5.2.1	University/industry research collaboration†	41.5	63	
5.2.2	State of cluster development†	45.8	72	◆
5.2.3	GERD financed by abroad, %	n/a	n/a	
5.2.4	JV-strategic alliance deals/bn PPP$ GDP	n/a	n/a	
5.2.5	Patent families 2+ offices/bn PPP$ GDP	n/a	n/a	
5.3	**Knowledge absorption**	**29.4**	**87**	
5.3.1	Intellectual property payments, % total trade 🕘	0.1	99	
5.3.2	High-tech imports, % total trade 🕘	9.8	35	●
5.3.3	ICT services imports, % total trade	0.6	96	
5.3.4	FDI net inflows, % GDP	3.0	57	
5.3.5	Research talent, % in business enterprise	n/a	n/a	
KNOWLEDGE & TECHNOLOGY OUTPUTS		**5.7**	**125**	○ ◇
6.1	**Knowledge creation**	**4.6**	**102**	
6.1.1	Patents by origin/bn PPP$ GDP	0.1	107	
6.1.2	PCT patents by origin/bn PPP$ GDP	0.0	79	
6.1.3	Utility models by origin/bn PPP$ GDP	0.4	36	
6.1.4	Scientific & technical articles/bn PPP$ GDP	5.5	76	
6.1.5	Citable documents H-index	2.6	114	
6.2	**Knowledge impact**	**3.9**	**[123]**	
6.2.1	Growth rate of PPP$ GDP/worker, %	n/a	n/a	
6.2.2	New businesses/th pop. 15-64	2.0	51	◆
6.2.3	Computer software spending, % GDP	0.0	103	
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	0.4	122	○
6.2.5	High- & medium-high-tech manufactures, %	n/a	n/a	
6.3	**Knowledge diffusion**	**8.6**	**113**	
6.3.1	Intellectual property receipts, % total trade 🕘	0.0	85	
6.3.2	High-tech net exports, % total trade 🕘	0.2	94	
6.3.3	ICT services exports, % total trade	0.8	86	
6.3.4	FDI net outflows, % GDP	0.4	74	
CREATIVE OUTPUTS		**16.9**	**108**	
7.1	**Intangible assets**	**33.0**	**100**	
7.1.1	Trademarks by origin/bn PPP$ GDP	10.3	105	
7.1.2	Industrial designs by origin/bn PPP$ GDP 🕘	0.2	97	
7.1.3	ICTs & business model creation†	60.8	62	◆
7.1.4	ICTs & organizational model creation†	51.0	77	◆
7.2	**Creative goods & services**	**1.5**	**[119]**	
7.2.1	Cultural & creative services exports, % total trade	0.0	105	
7.2.2	National feature films/mn pop. 15-69	n/a	n/a	
7.2.3	Entertainment & Media market/th pop. 15-69	n/a	n/a	
7.2.4	Printing & other media, % manufacturing	n/a	n/a	
7.2.5	Creative goods exports, % total trade 🕘	0.2	87	
7.3	**Online creativity**	**0.1**	**123**	○
7.3.1	Generic top-level domains (TLDs)/th pop. 15-69	0.1	120	○
7.3.2	Country-code TLDs/th pop. 15-69	0.1	113	
7.3.3	Wikipedia edits/mn pop. 15-69 🕘	0.2	117	○
7.3.4	Mobile app creation/bn PPP$ GDP	n/a	n/a	

NOTES: ● indicates a strength; ○ a weakness; ◆ an income group strength; ◇ an income group weakness; * an index; † a survey question. 🕘 indicates that the economy's data are older than the base year; see 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 Rwanda.

Indicators Graduates in science & engineering and Cultural & creative services exports, for which data were not available last year, become available in the GII 2019. Indicator JV–strategic alliance deals, for which data were available last year, becomes unavailable in the GII 2019.

Missing data

Code	Indicator name	Country year	Model year	Source
2.1.4	PISA scales in reading, maths & science	n/a	2015	OECD Programme for International Student Assessment (PISA)
2.3.2	Gross expenditure on R&D, % GDP	n/a	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
3.2.1	Electricity output, kWh/mn pop	n/a	2016	International Energy Agency
3.3.1	GDP/unit of energy use	n/a	2016	International Energy Agency
4.2.2	Market capitalization, % GDP	n/a	2017	World Federation of Exchanges
5.1.3	GERD performed by business, % GDP	n/a	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
5.1.4	GERD financed by business, %	n/a	2016	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
5.2.3	GERD financed by abroad, %	n/a	2016	UNESCO Institute for Statistics
5.2.4	JV–strategic alliance deals/bn PPP$ GDP	n/a	2018	Thomson Reuters
5.2.5	Patent families 2+ offices/bn PPP$ GDP	n/a	2015	World Intellectual Property Organization
5.3.5	Research talent, % in business enterprise	n/a	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
6.2.1	Growth rate of PPP$ GDP/worker, %, 3-year average	n/a	2018	The Conference Board
6.2.5	High- & medium-high-tech manufactures, %	n/a	2016	United Nations Industrial Development Organization
7.2.2	National feature films/mn pop. 15–69	n/a	2017	UNESCO Institute for Statistics
7.2.3	Entertainment & Media market/th pop. 15–69	n/a	2017	PwC
7.2.4	Printing & other media, % manufacturing	n/a	2016	United Nations Industrial Development Organization
7.3.4	Mobile app creation/bn PPP$ GDP	n/a	2018	App Annie

Outdated data

Code	Indicator name	Country year	Model year	Source
2.3.1	Researchers, FTE/mn pop.	2009	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
4.3.1	Applied tariff rate, weighted mean, %	2016	2017	World Bank
5.1.2	Firms offering formal training, % firms	2011	2013	World Bank
5.3.1	Intellectual property payments, % total trade	2009	2017	World Trade Organization
5.3.2	High-tech imports, % total trade	2016	2017	United Nations, COMTRADE
6.3.1	Intellectual property receipts, % total trade	2009	2017	World Trade Organization
6.3.2	High-tech net exports, % total trade	2016	2017	United Nations, COMTRADE
7.1.2	Industrial designs by origin/bn PPP$ GDP	2015	2017	World Intellectual Property Organization
7.2.5	Creative goods exports, % total trade	2016	2017	United Nations, COMTRADE
7.3.3	Wikipedia edits/mn pop. 15–69	2014	2017	Wikimedia Foundation

Model changes

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

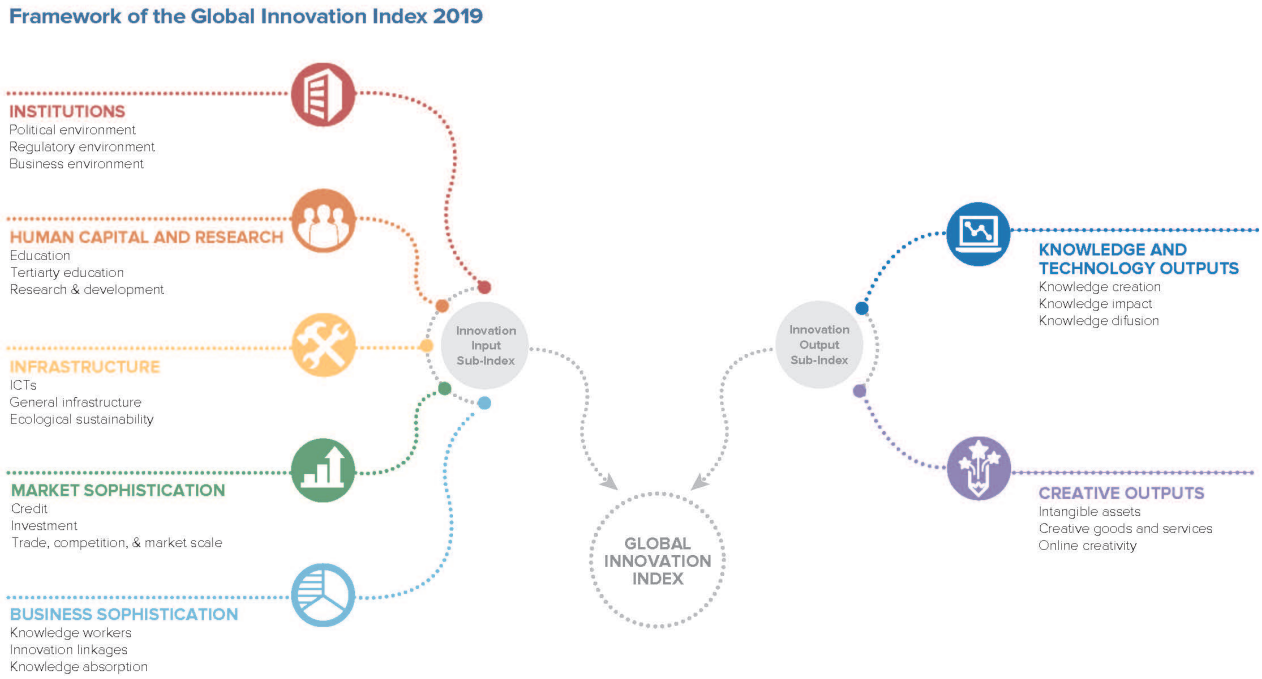
Changes to the GII 2019 framework

	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 GII presents its 12th edition devoted to the theme **Creating Healthy Lives—The Future of Medical Innovation**.

Recognizing that innovation is a key driver of economic development, the GII aims to provide a rich innovation ranking and 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 countries 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 includes 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 containing three sub-pillars.