

GLOBAL INNOVATION INDEX 2019

SOUTH AFRICA

63rd

South Africa ranks 63rd 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 South Africa 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 South Africa's ranking in the GII 2019 is between 59 and 66.

South Africa's Rankings, 2017 - 2019

	GII	Innovation Inputs	Innovation Outputs
2019	63	51	68
2018	58	48	65
2017	57	49	69

- South Africa performs better in Innovation Inputs than Outputs.
- This year South Africa ranks 51st in Innovation Inputs, worse than last year and compared to 2017.
- As for Innovation Outputs, South Africa ranks 68th. This position is worse than last year, but better compared to 2017.

14th

South Africa ranks 14th among the 34 upper middle-income economies.

1st

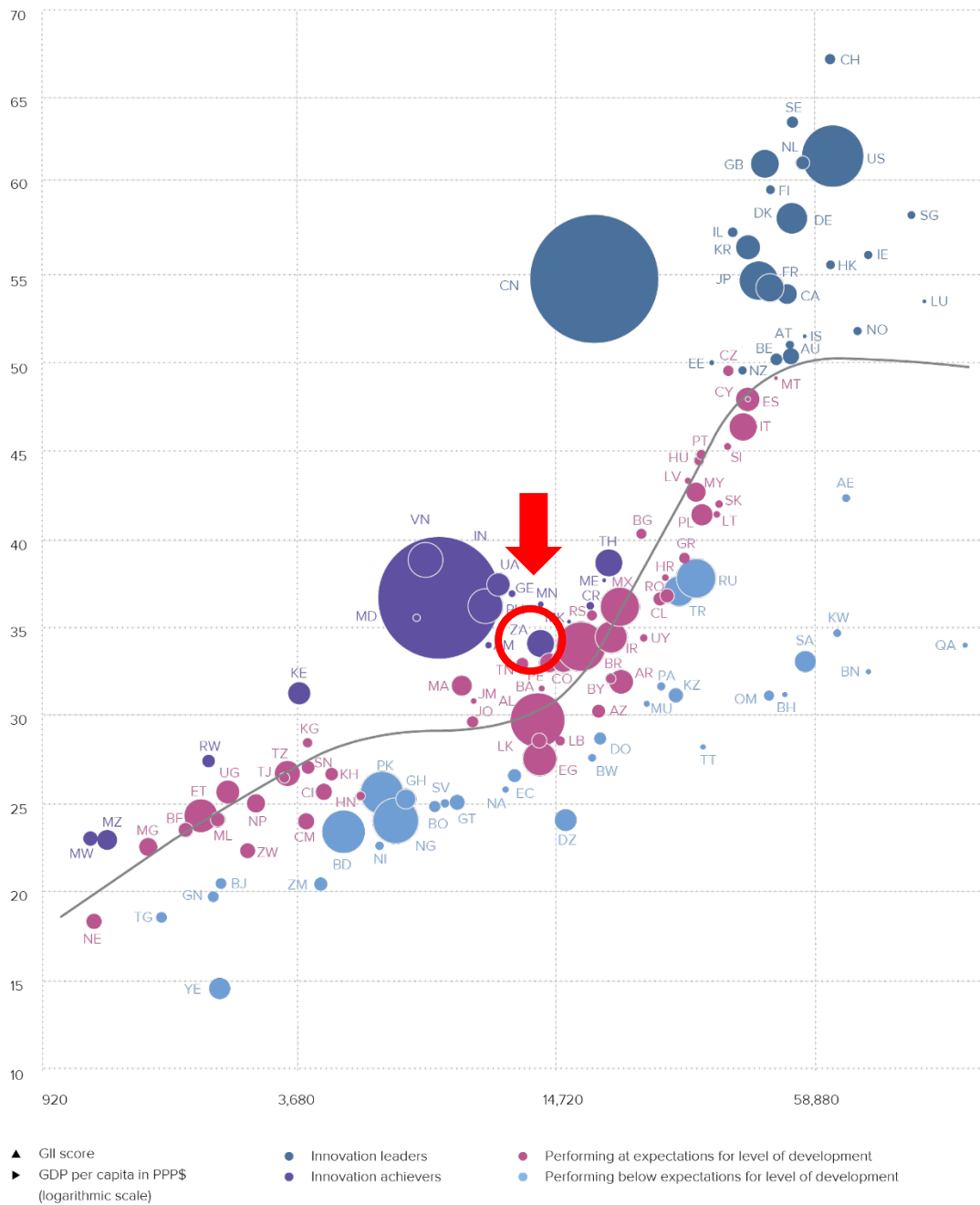
South Africa ranks 1st among the 26 economies in Sub-Saharan Africa.

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, South Africa performs above its expected level of development.

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

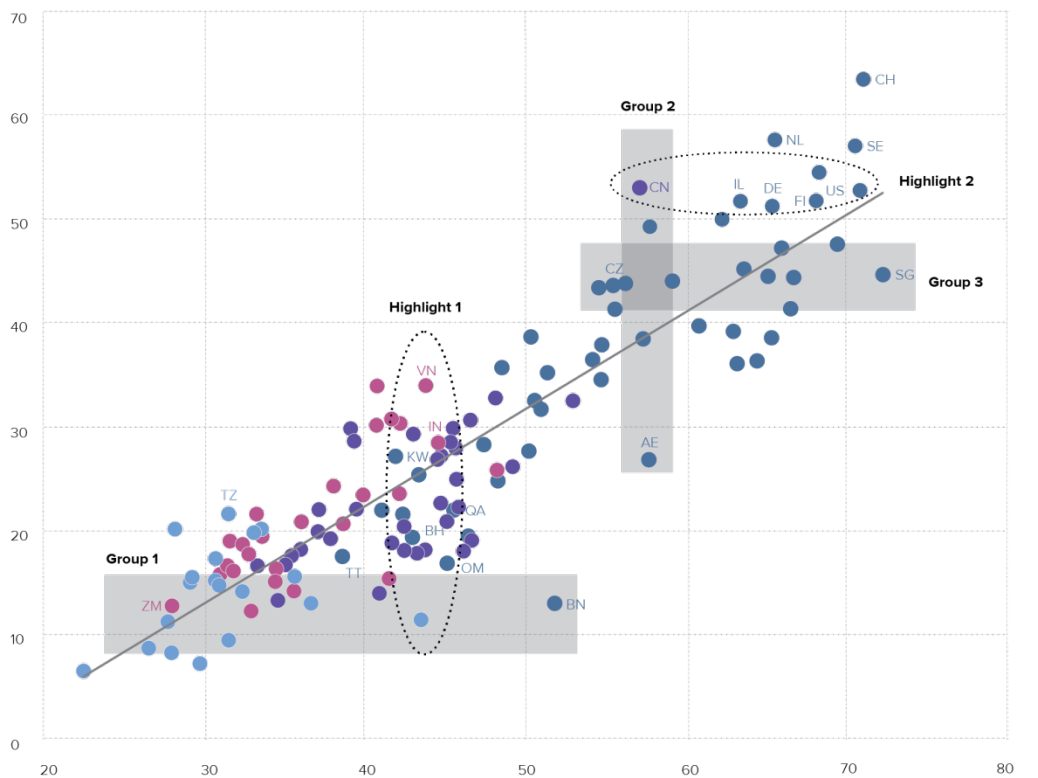


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

South Africa produces less innovation outputs relative to its level of innovation investments.

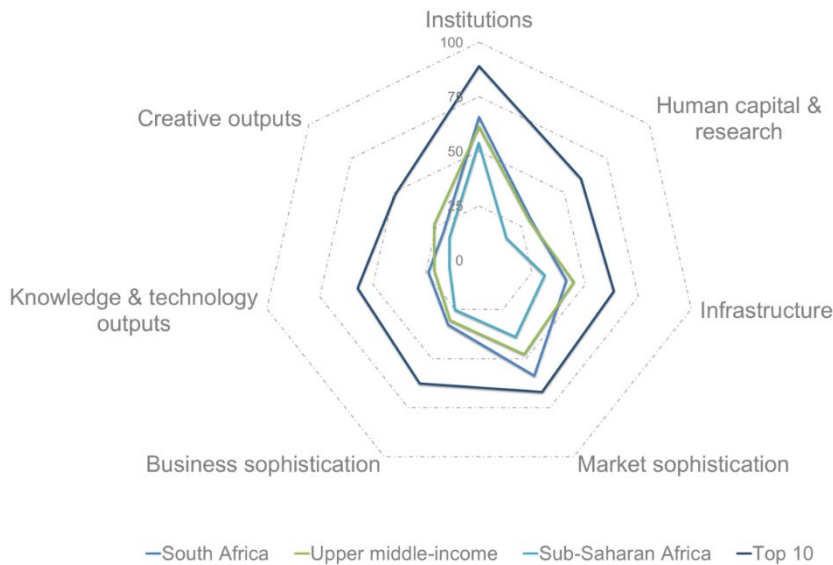
Innovation input/output performance by income group, 2019



- ▲ 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 SOUTH AFRICA TO OTHER UPPER MIDDLE-INCOME ECONOMIES AND THE SUB-SAHARAN AFRICA REGION

South Africa's scores in the seven GII pillars



Upper middle-income economies

South Africa has high scores in five out of the seven GII pillars: Institutions, Human capital & research, Market sophistication, Business sophistication, and Knowledge & technology outputs, which are above the average of the upper middle-income group.

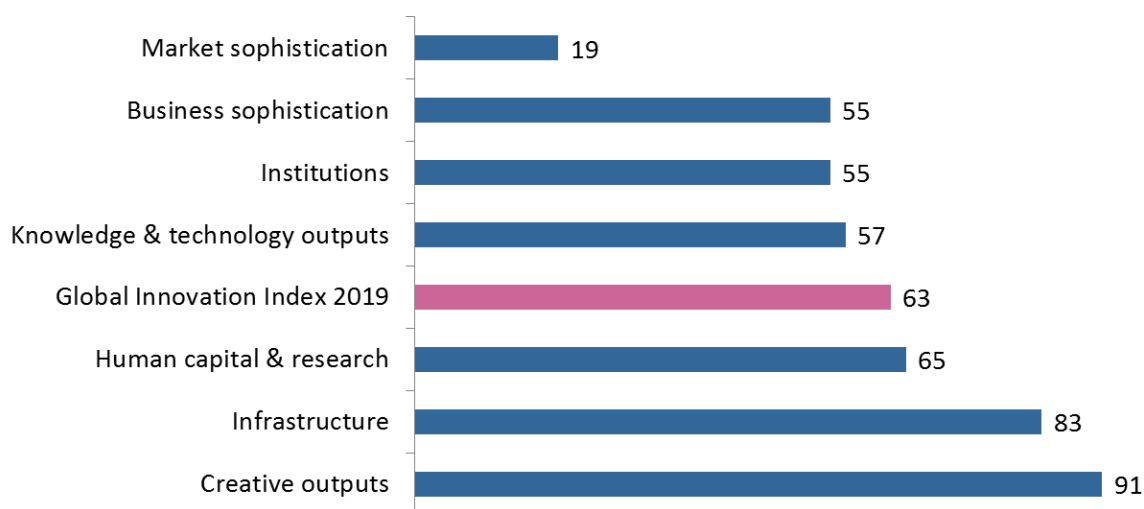
Sub-Saharan Africa Region

Compared to other economies in Sub-Saharan Africa, South Africa performs above average in all of the 7 GII pillars.

Top ranks are found in all sub-pillars in Market sophistication – Credit, Investment, and Trade, competition, & market scale, as well as in Regulatory environment, Research & development (R&D), Innovation linkages, and Knowledge creation where the country ranks in the top 50 worldwide.

OVERVIEW OF SOUTH AFRICA'S RANKINGS IN THE 7 GII AREAS

South Africa performs the best in Market sophistication and its weakest performance is in Creative outputs.



*The highest possible ranking in each pillar is 1.

SOUTH AFRICA'S INNOVATION STRENGTHS AND WEAKNESSES

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

Strengths

Code	Indicator name	Rank
1.2.3	Cost of redundancy dismissal, salary weeks	25
2.1.1	Expenditure on education, % GDP	20
4	Market sophistication	19
4.1.2	Domestic credit to private sector, % GDP	9
4.2	Investment	19
4.2.1	Ease of protecting minority investors*	21
4.2.2	Market capitalization, % GDP	1
4.3.3	Domestic market scale, bn PPP\$	29
5.3.1	Intellectual property payments, % total trade	13
5.3.2	High-tech imports, % total trade	32
6.1.5	Citable documents H index	32
6.2.2	New businesses/th pop. 15–64	12

Weaknesses

Code	Indicator name	Rank
1.3.1	Ease of starting a business*	102
2.1.5	Pupil-teacher ratio, secondary	101
3.2.3	Gross capital formation, % GDP	102
3.3	Ecological sustainability	119
3.3.1	GDP/unit of energy use	111
3.3.2	Environmental performance*	110
4.1.3	Microfinance gross loans, % GDP	64
5.3.4	FDI net inflows, % GDP, 3-year average	117
6.2.1	Growth rate of PPP\$ GDP/worker, %, 3-year average	97
7.2.2	National feature films/mn pop. 15–69	90
7.3.4	Mobile app creation/bn PPP\$ GDP	75

STRENGTHS

- GII strengths for South Africa are found in five of the seven GII pillars, and mostly on the innovation input side of the GII.
- Pillar Market sophistication (19) is a notable strength of South Africa. Most of the country's strengths are in this pillar.
- In Market sophistication (19), strengths are sub-pillar Investment (19) and indicators Domestic credit to private sector (9), Ease of protecting minority investors (21), Domestic market scale (29), and Market capitalization – where South Africa ranks 1st.
- In Institutions (55), South Africa exhibits strength in indicator Cost of redundancy dismissal (25).
- In Human capital & research (65), indicator Expenditure on education (20) is a relative strength for this country.
- In Business sophistication (55), South Africa's strengths are indicators Intellectual property payments (13) and High-tech imports (32).
- In Knowledge & technology outputs (57), indicators Quality of scientific publications (32) and New businesses (12) are GII strengths for the country.

WEAKNESSES

- South Africa's weaknesses in the GII are found in all of the seven GII pillars.
- Several of these weaknesses are in Infrastructure (83), and in particular in sub-pillar Ecological sustainability (119) as well as two of three indicators: GDP per unit of energy use (111) and Environmental performance (110). In this pillar, indicator Gross capital formation (102) is another GII weaknesses for South Africa.
- In Institutions (55), South Africa exhibits weakness in indicator Ease of starting a business (102).
- In Human capital & research (65), indicator Pupil-teacher ratio (101) is a GII weakness for this country.
- In Market sophistication (19), South Africa's weakness is indicator Microfinance gross loans (64).
- In Business sophistication (55), only one relative weakness is found in indicator FDI inflows (117).
- In Knowledge & technology outputs (57), indicator Labor productivity growth (97) is a relative weakness for the country.
- In Creative outputs (91), South Africa shows relative weaknesses in two indicators: National feature films (90) and Mobile app creation (75).

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP\$	GDP per capita, PPP\$	GII 2018 rank
68	51	Upper middle	SSF	57.4	790.9	13,675.3	58
				Score/Value	Rank		
INSTITUTIONS				65.9	55		
1.1	Political environment		57.2	61			
1.1.1	Political and operational stability*		64.9	79			
1.1.2	Government effectiveness*		53.3	51			
1.2	Regulatory environment		72.6	43	◆		
1.2.1	Regulatory quality*		48.2	59			
1.2.2	Rule of law*		46.1	65			
1.2.3	Cost of redundancy dismissal, salary weeks		9.3	25	●		
1.3	Business environment		67.9	70			
1.3.1	Ease of starting a business*		81.2	102	○		
1.3.2	Ease of resolving insolvency*		54.5	61			
HUMAN CAPITAL & RESEARCH				30.4	65		
2.1	Education		44.4	71			
2.1.1	Expenditure on education, % GDP		6.1	20	● ◆		
2.1.2	Government funding/pupil, secondary, % GDP/cap		19.5	51			
2.1.3	School life expectancy, years		13.7	71			
2.1.4	PISA scales in reading, maths, & science		n/a	n/a			
2.1.5	Pupil-teacher ratio, secondary		26.8	101	○ ◇		
2.2	Tertiary education		21.0	92			
2.2.1	Tertiary enrolment, % gross		20.5	93	◇		
2.2.2	Graduates in science & engineering, %		18.5	70			
2.2.3	Tertiary inbound mobility, %		4.3	49			
2.3	Research & development (R&D)		25.8	43			
2.3.1	Researchers, FTE/mn pop.		473.1	69			
2.3.2	Gross expenditure on R&D, % GDP		0.8	44			
2.3.3	Global R&D companies, avg. exp. top 3, mn US\$		46.6	33	◆		
2.3.4	QS university ranking, average score top 3*		33.6	33			
INFRASTRUCTURE				41.1	83		
3.1	Information & communication technologies (ICTs)		66.3	67			
3.1.1	ICT access*		53.8	80			
3.1.2	ICT use*		43.1	81			
3.1.3	Government's online service*		83.3	37			
3.1.4	E-participation*		84.8	39			
3.2	General infrastructure		32.6	71			
3.2.1	Electricity output, kWh/mn pop.		4,461.7	49			
3.2.2	Logistics performance*		61.4	32	◆		
3.2.3	Gross capital formation, % GDP		18.1	102	○		
3.3	Ecological sustainability		24.4	119	○ ◇		
3.3.1	GDP/unit of energy use		4.8	111	○ ◇		
3.3.2	Environmental performance*		44.7	110	○ ◇		
3.3.3	ISO 14001 environmental certificates/bn PPP\$ GDP		1.6	53			
MARKET SOPHISTICATION				58.6	19	● ◆	
4.1	Credit		44.0	48			
4.1.1	Ease of getting credit*		60.0	66			
4.1.2	Domestic credit to private sector, % GDP		147.7	9	● ◆		
4.1.3	Microfinance gross loans, % GDP		0.0	64	○		
4.2	Investment		62.7	19	● ◆		
4.2.1	Ease of protecting minority investors*		73.3	21	● ◆		
4.2.2	Market capitalization, % GDP		302.1	1	● ◆		
4.2.3	Venture capital deals/bn PPP\$ GDP		0.0	46			
4.3	Trade, competition, & market scale		69.2	36			
4.3.1	Applied tariff rate, weighted avg., %		4.6	80			
4.3.2	Intensity of local competition*		71.2	48			
4.3.3	Domestic market scale, bn PPP\$		790.9	29	●		
BUSINESS SOPHISTICATION				32.7	55		
5.1	Knowledge workers		33.9	74			
5.1.1	Knowledge-intensive employment, %		23.2	64			
5.1.2	Firms offering formal training, % firms		n/a	n/a			
5.1.3	GERD performed by business, % GDP		0.3	46			
5.1.4	GERD financed by business, %		38.9	48			
5.1.5	Females employed w/advanced degrees, %		10.2	64			
5.2	Innovation linkages		29.9	48	◆		
5.2.1	University/industry research collaboration†		54.2	33	◆		
5.2.2	State of cluster development†		56.4	32	◆		
5.2.3	GERD financed by abroad, %		13.0	32			
5.2.4	JV-strategic alliance deals/bn PPP\$ GDP		0.0	45			
5.2.5	Patent families 2+ offices/bn PPP\$ GDP		0.3	40			
5.3	Knowledge absorption		34.4	60			
5.3.1	Intellectual property payments, % total trade		2.0	13	● ◆		
5.3.2	High-tech imports, % total trade		9.9	32	●		
5.3.3	ICT services imports, % total trade		1.2	60			
5.3.4	FDI net inflows, % GDP		0.5	117	○ ◇		
5.3.5	Research talent, % in business enterprise		17.7	59			
KNOWLEDGE & TECHNOLOGY OUTPUTS				23.9	57		
6.1	Knowledge creation		19.3	48			
6.1.1	Patents by origin/bn PPP\$ GDP		0.9	63			
6.1.2	PCT patents by origin/bn PPP\$ GDP		0.3	44			
6.1.3	Utility models by origin/bn PPP\$ GDP		n/a	n/a			
6.1.4	Scientific & technical articles/bn PPP\$ GDP		10.3	45			
6.1.5	Citable documents H-index		28.4	32	● ◆		
6.2	Knowledge impact		37.9	58			
6.2.1	Growth rate of PPP\$ GDP/worker, %		-0.4	97	○		
6.2.2	New businesses/th pop. 15-64		10.2	12	● ◆		
6.2.3	Computer software spending, % GDP		0.3	48			
6.2.4	ISO 9001 quality certificates/bn PPP\$ GDP		5.5	56			
6.2.5	High- & medium-high-tech manufactures, %		0.3	40			
6.3	Knowledge diffusion		14.4	80			
6.3.1	Intellectual property receipts, % total trade		0.1	49			
6.3.2	High-tech net exports, % total trade		2.0	55			
6.3.3	ICT services exports, % total trade		0.7	91			
6.3.4	FDI net outflows, % GDP		1.8	32			
CREATIVE OUTPUTS				20.8	91		
7.1	Intangible assets		36.3	89			
7.1.1	Trademarks by origin/bn PPP\$ GDP		20.9	86			
7.1.2	Industrial designs by origin/bn PPP\$ GDP		1.3	60			
7.1.3	ICTs & business model creation†		57.2	80			
7.1.4	ICTs & organizational model creation†		58.7	48			
7.2	Creative goods & services		6.9	95			
7.2.1	Cultural & creative services exports, % total trade		0.2	70			
7.2.2	National feature films/mn pop. 15-69		0.8	90	○		
7.2.3	Entertainment & Media market/th pop. 15-69		8.8	38	◆		
7.2.4	Printing & other media, % manufacturing		n/a	n/a			
7.2.5	Creative goods exports, % total trade		0.8	48			
7.3	Online creativity		3.7	73			
7.3.1	Generic top-level domains (TLDs)/th pop. 15-69		3.0	63			
7.3.2	Country-code TLDs/th pop. 15-69		8.6	42			
7.3.3	Wikipedia edits/mn pop. 15-69		4.2	87			
7.3.4	Mobile app creation/bn PPP\$ GDP		0.3	75	○		

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

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

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)
5.1.2	Firms offering formal training, % firms	n/a	2013	World Bank
6.1.3	Utility models by origin/bn PPP\$ GDP	n/a	2017	World Intellectual Property Organization
7.2.4	Printing & other media, % manufacturing	n/a	2016	United Nations Industrial Development Organization

Outdated data

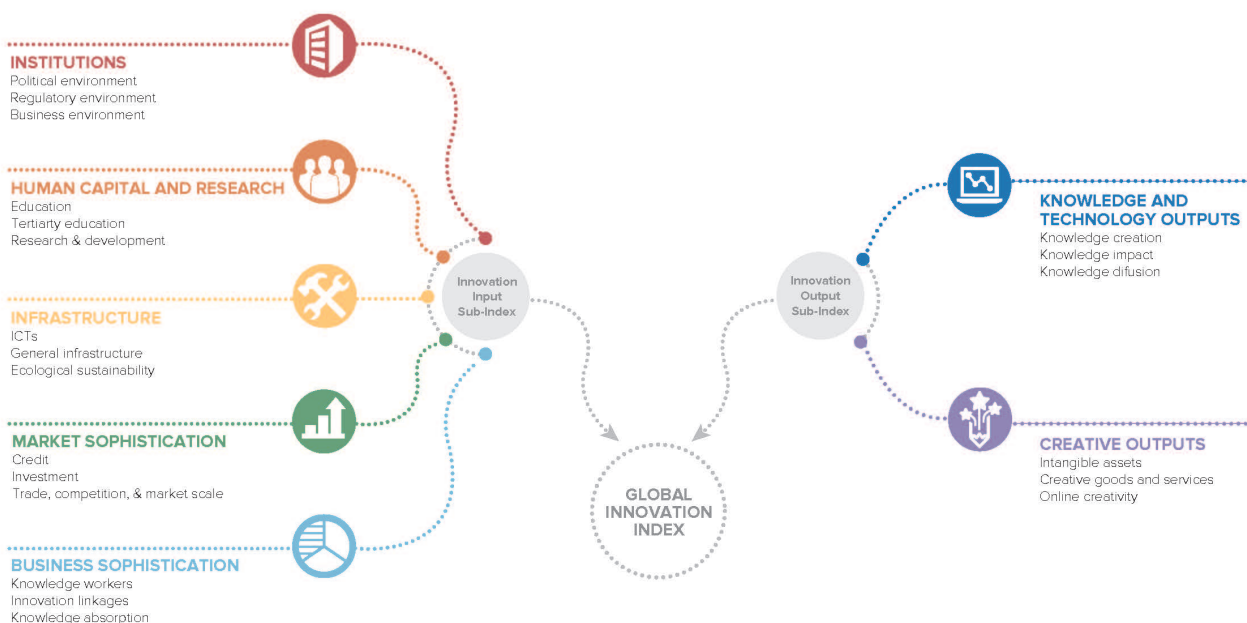
Code	Indicator name	Country year	Model year	Source
2.1.5	Pupil-teacher ratio, secondary	2016	2017	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	2016	2017	UNESCO Institute for Statistics
2.3.1	Researchers, FTE/mn pop.	2015	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
2.3.2	Gross expenditure on R&D, % GDP	2015	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
4.1.3	Microfinance gross loans, % GDP	2016	2017	Microfinance Information Exchange
5.1.3	GERD performed by business, % GDP	2015	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
5.1.4	GERD financed by business, %	2015	2016	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
5.2.3	GERD financed by abroad, %	2015	2016	UNESCO Institute for Statistics
5.3.5	Research talent, % in business enterprise	2015	2017	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
6.2.5	High- & medium-high-tech manufactures, %	2010	2016	United Nations Industrial Development Organization
7.2.1	Cultural & creative services exports, % total trade	2016	2017	World Trade Organization
7.2.2	National feature films/mn pop. 15–69	2016	2017	UNESCO Institute for Statistics
7.3.3	Wikipedia edits/mn pop. 15–69	2016	2017	Wikimedia Foundation

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.

Framework of the Global Innovation Index 2019



The Index is a ranking of the innovation capabilities and results of world economies. It measures innovation based on criteria that includes institutions, human capital and research, infrastructure, credit, investment, linkages; the creation, absorption and diffusion of knowledge; and creative outputs.

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

