



GLOBAL INNOVATION INDEX 2019

LUXEMBOURG

18th

Luxembourg ranks 18th 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 Luxembourg 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 Luxembourg's ranking in the GII 2019 is between 16 and 18.

Luxembourg's Rankings, 2017 - 2019

	GII	Innovation Inputs	Innovation Outputs
2019	18	23	11
2018	15	25	4
2017	12	24	4

- Luxembourg performs better in Innovation Outputs than Inputs.
- This year Luxembourg ranks 23rd in Innovation Inputs, better than last year and compared to 2017.
- As for Innovation Outputs, Luxembourg ranks 11th. This position is worse than last year and compared to 2017.

17th

Luxembourg ranks 17th among the 50 high-income economies.

10th

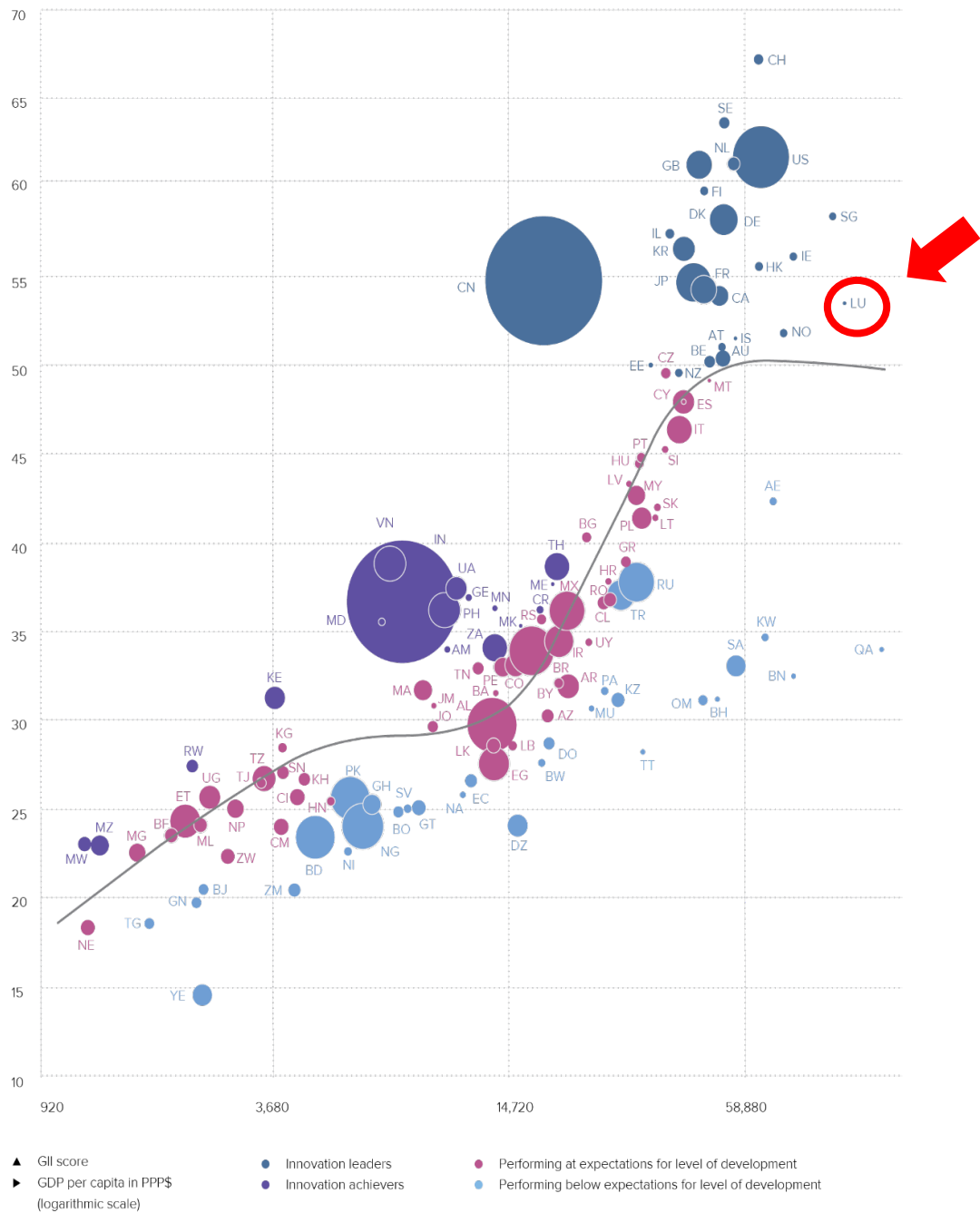
Luxembourg ranks 10th among the 39 economies in Europe.

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, Luxembourg performs above its expected level of development.

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

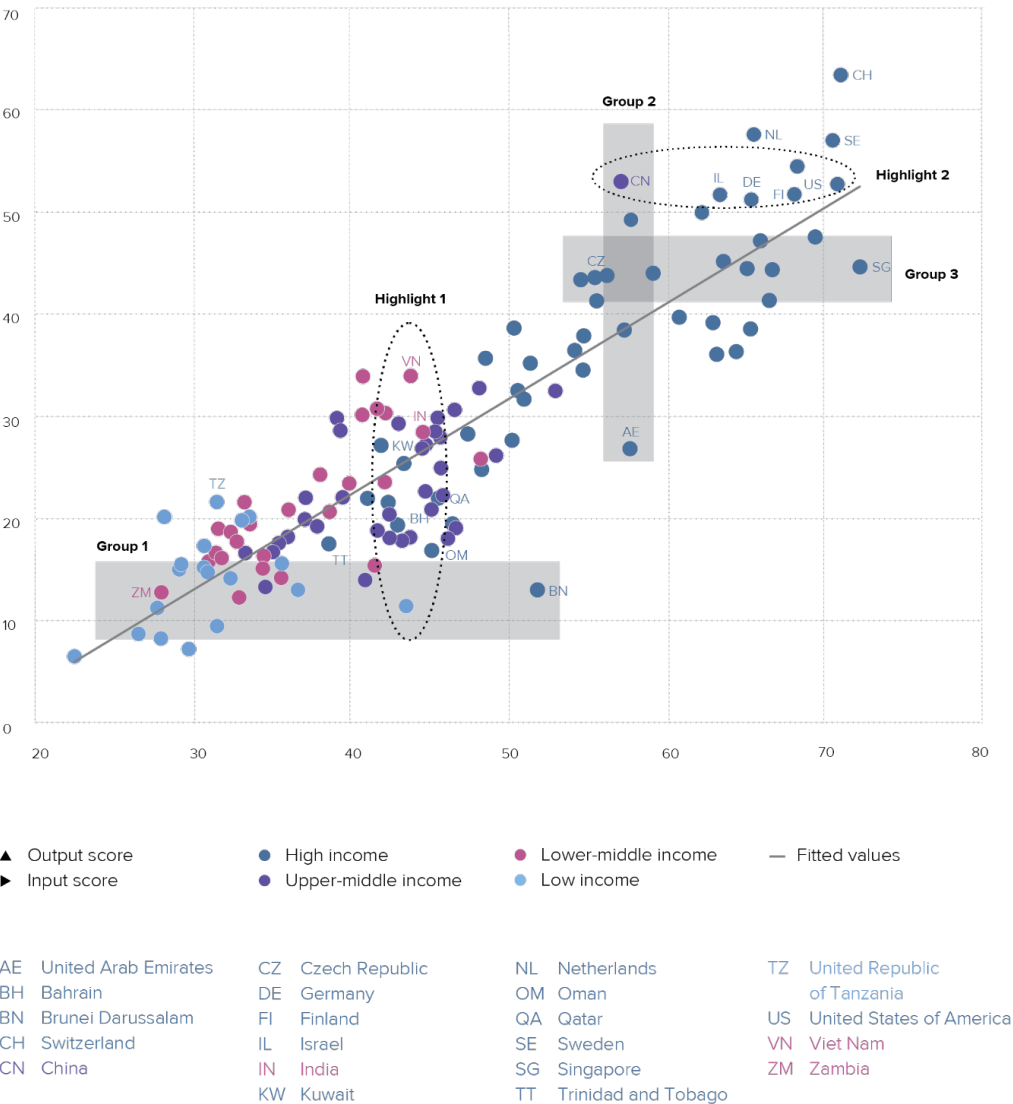


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

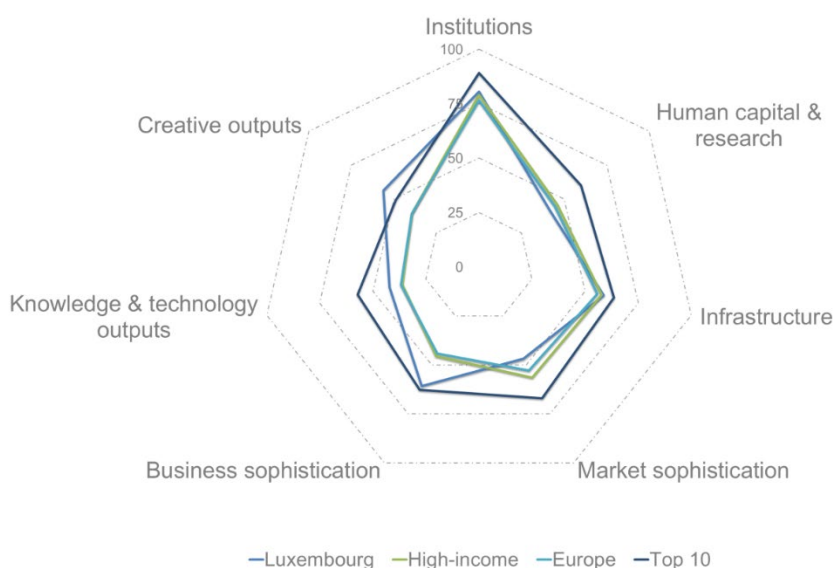
Luxembourg produces more innovation outputs relative to its level of innovation investments.

Innovation input/output performance by income group, 2019



BENCHMARKING LUXEMBOURG TO OTHER HIGH-INCOME ECONOMIES AND THE EUROPE REGION

Luxembourg's scores in the seven GII pillars



High-income economies

Luxembourg has high scores in five out of the seven GII pillars: Institutions, Infrastructure, Business sophistication, Knowledge & technology outputs, and Creative outputs, which are above the average of the high-income group.

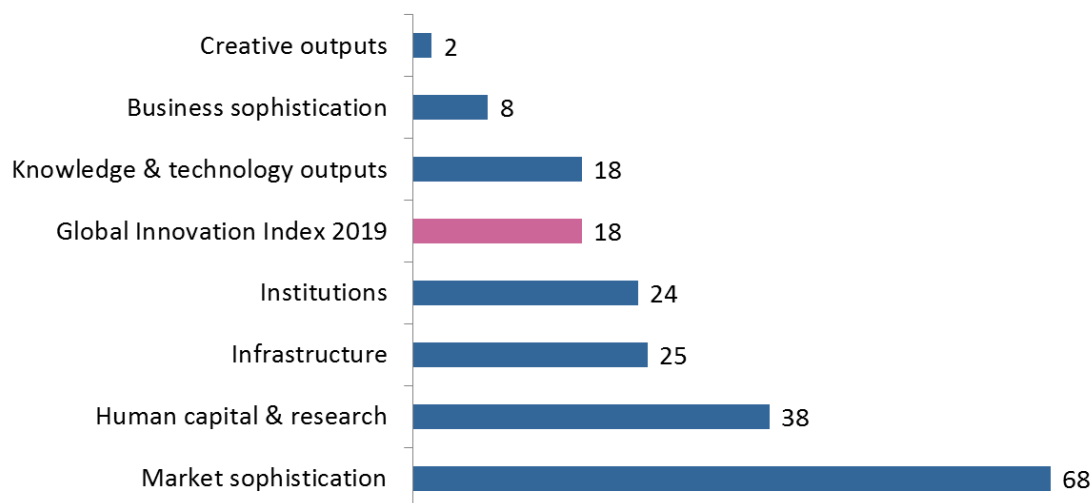
Europe Region

Compared to other economies in Europe, Luxembourg performs above average in the same five GII pillars: Institutions, Infrastructure, Business sophistication, Knowledge & technology outputs, and Creative outputs.

Top ranks are found in all sub-pillars of Creative outputs – Intangible assets, Creative goods & services, and Online creativity – as well as in sub-pillars Information and communication technologies (ICTs), Innovation linkages, and Knowledge absorption, where the country ranks in the top 10 worldwide.

OVERVIEW OF LUXEMBOURG'S RANKINGS IN THE 7 GII AREAS

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



*The highest possible ranking in each pillar is 1.

LUXEMBOURG'S INNOVATION STRENGTHS AND WEAKNESSES

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

Strengths		
Code	Indicator name	Rank
1.1.1	Political & operational stability*	2
2.2.3	Tertiary inbound mobility, %	1
3.1	Information & communication technologies (ICTs)	5
3.1.1	ICT access*	1
5.1.1	Knowledge-intensive employment, %	2
5.2	Innovation linkages	6
5.3	Knowledge absorption	4
5.3.1	Intellectual property payments, % total trade	1
5.3.4	FDI net inflows, % GDP, 3-year average	3
6.1.2	PCT patents by origin/bn PPP\$ GDP	1
6.3.4	FDI net outflows, % GDP, 3-year average	1
7	Creative outputs	2
7.2.1	Cultural & creative services exports, % total trade	1
7.2.2	National feature films/mn pop. 15–69	1
7.3	Online creativity	1
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	4

Weaknesses		
Code	Indicator name	Rank
2.2.1	Tertiary enrolment, % gross	94
2.2.2	Graduates in science & engineering, %	74
2.3.4	QS university ranking, average score top 3*	78
3.2.1	Electricity output, kWh/mn pop	88
3.2.3	Gross capital formation, % GDP	106
4.1.1	Ease of getting credit*	124
4.2.1	Ease of protecting minority investors*	99
5.3.2	High-tech imports, % total trade	127
6.2.1	Growth rate of PPP\$ GDP/worker, %, 3-year average	101
7.2.5	Creative goods exports, % total trade	100

STRENGTHS

- GII strengths for Luxembourg are found in six of the seven GII pillars.
- Pillar Creative outputs (2) is one of Luxembourg's strengths.
- In Creative outputs (2), other strengths are sub-pillar Online creativity and indicators Generic top-level domains (TLDs) (4), Cultural & creative services exports, and National feature films. In the latter two indicators Luxembourg is world leader.
- In Business sophistication (8), five other strengths are found: sub-pillars Innovation linkages (6) and Knowledge absorption (4) and indicators Knowledge-intensive employment (2), FDI inflows (3), and Intellectual property payments, where Luxembourg takes the top spot in the world.
- In Institutions (24), Luxembourg's strength is indicator Political & operational stability (2).
- In Human capital & research (38), Luxembourg's strength is indicator Tertiary inbound mobility, where it positions 1st globally.
- In Infrastructure (25), Luxembourg demonstrates strengths in sub-pillar Information & communication technologies (ICTs) (5) as well as in indicator ICT access, where it ranks 1st in the world.
- In Knowledge & technology outputs (18), Luxembourg demonstrates strengths in two indicators: PCT patents by origin and FDI outflows, placing 1st in both.

WEAKNESSES

- Luxembourg's weaknesses in the GII are found in six of the seven GII pillars.
- In Human capital & research (38), Luxembourg's relative weaknesses are indicators Tertiary enrolment (94), Graduates in science & engineering (74), and Quality of universities (78).
- In Infrastructure (25), Luxembourg's weaknesses are indicators Electricity output (88) and Gross capital formation (106).
- In Market sophistication (68), two indicators - Ease of getting credit (124) and Ease of protecting minority investors (99) – are GII weaknesses for the country.
- In Business sophistication (8), Luxembourg has only one weakness in indicator High-tech imports (127).
- In Knowledge & technology outputs (18), indicator Labor productivity growth (101) is a relative weakness for this country.
- In Creative outputs (2), Luxembourg's only weakness is indicator Creative goods exports (100).

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP\$	GDP per capita, PPP\$	GII 2018 rank				
11	23	High	EUR	0.6	66.1	106,704.9	15				
Score/Value				Score/Value							
Rank				Rank							
INSTITUTIONS.....				BUSINESS SOPHISTICATION.....							
80.7 24				60.7 8							
1.1	Political environment.....			90.4	11	5.1	Knowledge workers.....		66.1	16	
1.1.1	Political and operational stability*.....			96.5	2	5.1.1	Knowledge-intensive employment, %.....		55.9	2	
1.1.2	Government effectiveness*.....			87.3	12	5.1.2	Firms offering formal training, % firms.....		n/a	n/a	
1.2	Regulatory environment.....			84.5	22	5.1.3	GERD performed by business, % GDP.....		0.7	28	
1.2.1	Regulatory quality*.....			87.3	13	5.1.4	GERD financed by business, %.....		47.1	32	
1.2.2	Rule of law*.....			92.3	11	5.1.5	Females employed w/advanced degrees, %.....		17.7	30	
1.2.3	Cost of redundancy dismissal, salary weeks.....			21.7	91	5.2	Innovation linkages.....		56.8	6	
1.3	Business environment.....			67.1	74	5.2.1	University/industry research collaboration*.....		68.2	13	
1.3.1	Ease of starting a business*.....			88.7	59	5.2.2	State of cluster development*.....		67.0	13	
1.3.2	Ease of resolving insolvency*.....			45.5	81	5.2.3	GERD financed by abroad, %.....		3.4	69	
1.3.2						5.2.4	JV-strategic alliance deals/bn PPP\$ GDP.....		0.1	11	
1.3.2						5.2.5	Patent families 2+ offices/bn PPP\$ GDP.....		8.2	4	
HUMAN CAPITAL & RESEARCH.....				5.3				Knowledge absorption.....		59.1	4
41.7 38				5.3.1				Intellectual property payments, % total trade.....		4.3	1
2.1	Education.....			48.3	66	5.3.2	High-tech imports, % total trade.....		1.9	127	
2.1.1	Expenditure on education, % GDP.....			3.9	82	5.3.3	ICT services imports, % total trade.....		3.1	8	
2.1.2	Government funding/pupil, secondary, % GDP/cap... ..			19.2	52	5.3.4	FDI net inflows, % GDP.....		35.7	3	
2.1.3	School life expectancy, years.....			14.2	68	5.3.5	Research talent, % in business enterprise.....		41.9	32	
2.1.4	PISA scales in reading, maths, & science.....			483.3	32						
2.1.5	Pupil-teacher ratio, secondary.....			8.8	17						
2.2	Tertiary education.....			41.1	34						
2.2.1	Tertiary enrolment, % gross.....			19.6	94						
2.2.2	Graduates in science & engineering, %.....			17.9	74						
2.2.3	Tertiary inbound mobility, %.....			47.0	1						
2.3	Research & development (R&D).....			35.6	31						
2.3.1	Researchers, FTE/mn pop.....			4,682.5	15						
2.3.2	Gross expenditure on R&D, % GDP.....			1.3	29						
2.3.3	Global R&D companies, avg. exp. top 3, mn US\$.....			58.7	23						
2.3.4	QS university ranking, average score top 3*.....			0.0	78						
INFRASTRUCTURE.....				6.1				Knowledge creation.....		43.5	15
58.7 25				6.1.1				Patents by origin/bn PPP\$ GDP.....		11.5	9
3.1	Information & communication technologies (ICTs).....			90.7	5	6.1.2	PCT patents by origin/bn PPP\$ GDP.....		5.9	1	
3.1.1	ICT access*.....			94.2	1	6.1.3	Utility models by origin/bn PPP\$ GDP.....		n/a	n/a	
3.1.2	ICT use*.....			82.4	10	6.1.4	Scientific & technical articles/bn PPP\$ GDP.....		12.1	41	
3.1.3	Government's online service*.....			92.4	22	6.1.5	Citable documents H-index.....		9.1	74	
3.1.4	E-participation*.....			93.8	19	6.2	Knowledge impact.....		34.9	74	
3.2	General infrastructure.....			32.2	74	6.2.1	Growth rate of PPP\$ GDP/worker, %.....		-0.9	101	
3.2.1	Electricity output, kWh/mn pop.....			1,480.0	88	6.2.2	New businesses/th pop. 15-64.....		15.4	8	
3.2.2	Logistics performance*.....			73.3	24	6.2.3	Computer software spending, % GDP.....		0.2	69	
3.2.3	Gross capital formation, % GDP.....			17.4	106	6.2.4	ISO 9001 quality certificates/bn PPP\$ GDP.....		3.4	72	
3.3	Ecological sustainability.....			53.3	17	6.2.5	High- & medium-high-tech manufactures, %.....		0.1	68	
3.3.1	GDP/unit of energy use.....			13.9	17	6.3	Knowledge diffusion.....		48.0	11	
3.3.2	Environmental performance*.....			79.1	7	6.3.1	Intellectual property receipts, % total trade.....		2.0	11	
3.3.3	ISO 14001 environmental certificates/bn PPP\$ GDP..			1.9	49	6.3.2	High-tech net exports, % total trade.....		0.6	76	
3.3.3						6.3.3	ICT services exports, % total trade.....		3.5	24	
3.3.3						6.3.4	FDI net outflows, % GDP.....		63.5	1	
MARKET SOPHISTICATION.....				7.1				Intangible assets.....		59.4	9
46.9 68				7.1.1				Trademarks by origin/bn PPP\$ GDP.....		102.9	11
4.1	Credit.....			32.8	77	7.1.2	Industrial designs by origin/bn PPP\$ GDP.....		4.6	28	
4.1.1	Ease of getting credit*.....			15.0	124	7.1.3	ICTs & business model creation*.....		80.3	9	
4.1.2	Domestic credit to private sector, % GDP.....			105.9	21	7.1.4	ICTs & organizational model creation*.....		72.2	15	
4.1.3	Microfinance gross loans, % GDP.....			n/a	n/a	7.2	Creative goods & services.....		38.6	9	
4.2	Investment.....			47.2	45	7.2.1	Cultural & creative services exports, % total trade.....		4.0	1	
4.2.1	Ease of protecting minority investors*.....			48.3	99	7.2.2	National feature films/mn pop. 15-69.....		42.4	1	
4.2.2	Market capitalization, % GDP.....			98.5	12	7.2.3	Entertainment & Media market/th pop. 15-69.....		n/a	n/a	
4.2.3	Venture capital deals/bn PPP\$ GDP.....			0.2	8	7.2.4	Printing & other media, % manufacturing.....		0.9	73	
4.3	Trade, competition, & market scale.....			60.7	65	7.2.5	Creative goods exports, % total trade.....		0.1	100	
4.3.1	Applied tariff rate, weighted avg., %.....			1.8	23	7.3	Online creativity.....		67.6	1	
4.3.2	Intensity of local competition*.....			72.4	43	7.3.1	Generic top-level domains (TLDs)/th pop. 15-69.....		90.8	4	
4.3.3	Domestic market scale, bn PPP\$.....			66.1	92	7.3.2	Country-code TLDs/th pop. 15-69.....		63.3	9	
4.3.3						7.3.3	Wikipedia edits/mn pop. 15-69.....		87.7	9	
4.3.3						7.3.4	Mobile app creation/bn PPP\$ GDP.....		57.2	9	

NOTES: ● indicates a strength; ○ a weakness; ◆ a strength relative to the other top 25-ranked GII economies; ◇ a weakness relative to the other top 25-ranked GII economies; * 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 Luxembourg.

Missing data

Code	Indicator name	Country year	Model year	Source
4.1.3	Microfinance gross loans, % GDP	n/a	2017	Microfinance Information Exchange
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
7.2.3	Entertainment & Media market/th pop. 15–69	n/a	2017	PwC

Outdated data

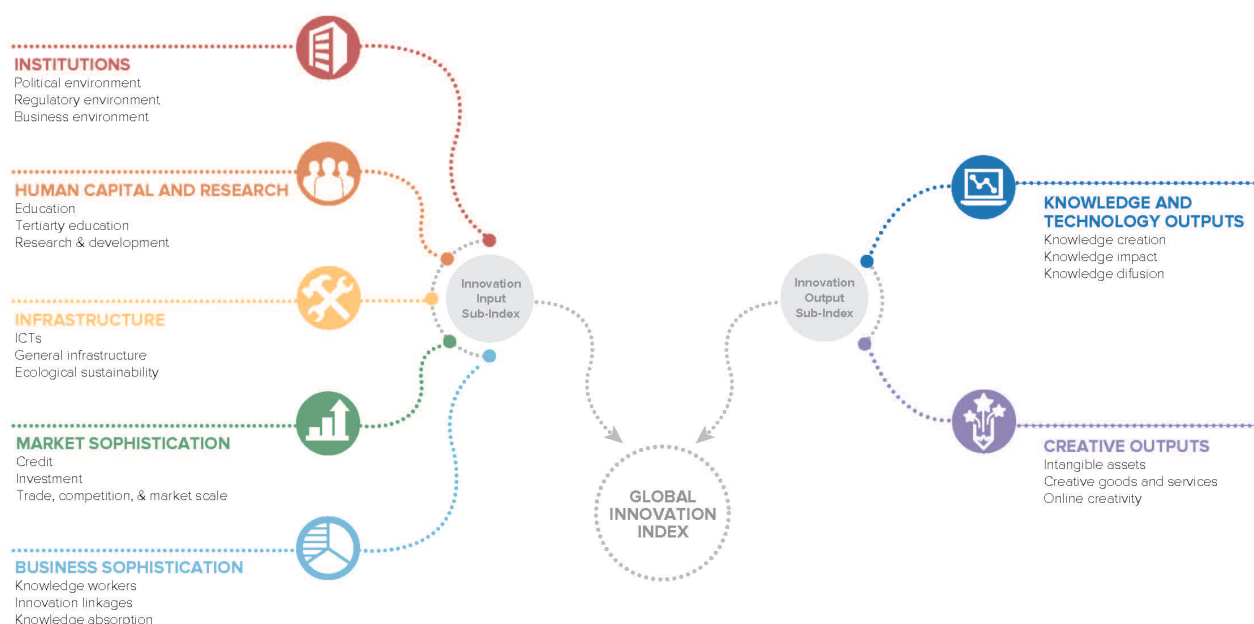
Code	Indicator name	Country year	Model year	Source
2.1.5	Pupil-teacher ratio, secondary	2016	2017	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	2016	2017	UNESCO Institute for Statistics
5.1.4	GERD financed by business, %	2015	2016	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
5.2.3	GERD financed by abroad, %	2015	2016	UNESCO Institute for Statistics
7.2.2	National feature films/mn pop. 15–69	2011	2017	UNESCO Institute for Statistics
7.3.3	Wikipedia edits/mn pop. 15–69	2014	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.

