

GLOBAL INNOVATION INDEX 2018

Luxembourg

15th Luxembourg is ranked 15th in the GII 2018, moving down 3 positions from the previous year.

The GII indicators are grouped into innovation inputs and outputs. The following table reflects Luxembourg's ranking over time¹.

Luxembourg's ranking over time

	GII	Input	Output	Efficiency
2018	15	25	4	2
2017	12	24	4	1
2016	12	23	3	1

- Luxembourg performs much better in innovation outputs than inputs.
- Over the last three years, the country has demonstrated stable ranking in innovation outputs, positioning 3rd-4th globally.
- Its position in innovation inputs slightly deteriorates this year, positioning 25th, down 1 from 2017.
- Luxembourg is highly efficient in translating innovation inputs into outputs. This is reflected in the Innovation Efficiency Ratio, which ranks 2nd in the world this year, down the 1st spot in the last two years. The Efficiency Ratio position is partly influenced by a much higher ranking in innovation outputs (4th) compared to inputs (25th).

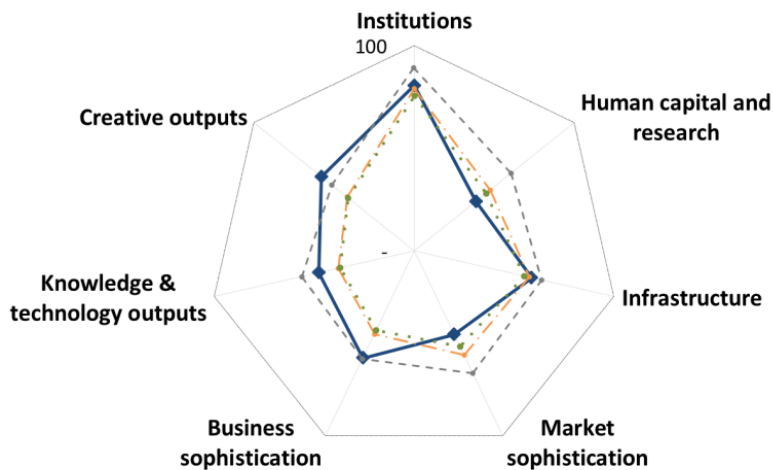
15th Luxembourg is ranked 15th among the 47 high-income countries in the GII 2018.

9th Luxembourg is ranked 9th among the 39 countries in Europe in the GII 2018.

¹ Note that year-on-year comparisons of the GII ranks are imperfect and influenced by changes in the GII model and data availability.

Benchmarking Luxembourg to other high-income countries and the Europe region

Luxembourg's scores by area



—◆— Luxembourg — Income group average — Regional average - - - Top 10

High-income countries

Luxembourg has high scores in 5 of the 7 GII areas – **Institutions, Infrastructure, Business Sophistication, Knowledge & Technology Outputs, and Creative Outputs**, in which it scores above the average of the high-income group.

Top scores in areas such as *Political environment, Information & Communication Technologies (ICTs), Knowledge workers, Knowledge diffusion, and Intangible assets* are behind these high rankings.

Europe region

Compared to other countries in the Europe region, Luxembourg performs above-average in 5 out of the 7 GII areas: **Institutions, Infrastructure, Business Sophistication, Knowledge & Technology Outputs, and Creative Outputs**.

Luxembourg's innovation profile

Strengths

- The major GII strengths for Luxembourg are the **Innovation Efficiency Ratio**, which ranks 2nd in the world, and the **Innovation Output Sub-index**, positioning 4th globally.
- Consistently, most strengths for the country are in the innovation output side of the GII.
- Luxembourg achieves remarkable results in **Creative Outputs**, which positions 2nd in the world and is highlighted as a strength. Two of its three components are also marked as strong: *Intangible assets* (3rd) and *Online creativity* (5th). At the indicator level, the country performs strongly in *ICTs & business model creation* (5th), *Generic top-level domains (TLDs)* (4th), as well as *Cultural & creative services exports* and *National feature films* – both taking the top spot in the world.
- Luxembourg also shows good performance in **Knowledge & Technology Outputs** (14th), where two indicators – *PCT patents by origin* and *FDI outflows* – are strong and rank 1st.
- On the **innovation input** side, Luxembourg presents strengths in four of the five GII input areas.

- In **Institutions** (24th), Luxembourg performs strongly in the indicator *Political stability & safety* – ranking 3rd in the world.
- The indicator *Tertiary inbound mobility* positions 1st globally and is strong within **Human Capital & Research** (42nd).
- In **Infrastructure** (23rd), the country performs strongly in two indicators: *ICT access* and *Logistics performance* - ranking 1st and 2nd respectively.
- The indicators *Knowledge-intensive employment* and *Joint venture–strategic alliance deals*, which rank 1st and 2nd respectively, are strengths in **Business Sophistication** (7th).

Weaknesses

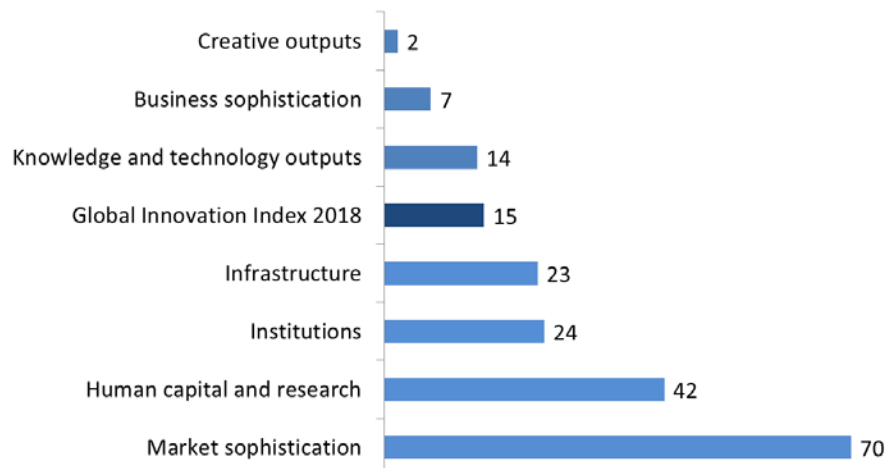
- Relative weaknesses for Luxembourg are mostly among **innovation inputs**, scattered across four areas.
- Several of these weaknesses are exhibited in **Market Sophistication** (70th), the lowest-ranked area for Luxembourg. Here it demonstrates relative weaknesses in the area *Credit* (91st) and in the indicators *Ease of getting credit* (124th), *Ease of protecting minority investors* (97th), and *Domestic market scale* (90th).
- In **Human Capital & Research** (42nd), three indicators – *Tertiary enrolment* (90th), *Graduates in science & engineering* (84th), and *Quality of universities* (78th) – are identified as weak.
- Finally, the indicators *Electricity output* (90th) and *Gross capital formation* (100th) are relatively weak within **Infrastructure** (23rd), while the indicator *High-tech imports* (124th) is weak in **Business Sophistication** (7th).
- On the **innovation output** side, only one relative weakness is found in the indicator. *Creative goods exports* (94th) in **Creative Outputs** (2nd).

The following figure presents a summary of Luxembourg’s ranks in the 7 GII areas, as well as the overall rank in the GII 2018.

Luxembourg’s rank in the GII 2018 and the 7 GII areas

Rank 1 is the highest possible in each pillar

Total number of countries: 126



Missing and Outdated Data

More and better data improves the ability of a country to understand its strengths and weaknesses and give policymakers greater capacity to plan and adapt public policies accordingly. The GII 2018 covers 126 countries that complied with the minimum indicator coverage of 35 indicators in the Innovation Input Sub-Index (66%) and 18 indicators in the Innovation Output Sub-Index (66%).

The following tables show data for Luxembourg that is not available or that is outdated.

Missing Data








Code	Indicator	Country Year	Model Year	Source
4.1.3	Microfinance gross loans, % GDP	n/a	2016	Microfinance Information Exchange, Mix Market
5.1.2	Firms offering formal training, % firms	n/a	2013	World Bank, Enterprise Surveys
6.1.3	Utility models by origin/bn PPP\$ GDP	n/a	2016	WIPO, Intellectual Property Statistics
7.2.3	Entertainment & Media market/th pop. 15–69	n/a	2016	PwC's Global Entertainment and Media Outlook, 2017–2021

Outdated Data

Code	Indicator	Country Year	Model Year	Source
2.1.3	School life expectancy, years	2015	2016	UNESCO Institute for Statistics
2.1.5	Pupil-teacher ratio, secondary	2015	2016	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	2015	2016	UNESCO Institute for Statistics
2.2.2	Graduates in science & engineering, %	2015	2016	UNESCO Institute for Statistics
2.2.3	Tertiary inbound mobility, %	2015	2016	UNESCO Institute for Statistics
6.2.5	High- & medium-high-tech manufactures, %	2014	2015	UNIDO, Industrial Statistics
7.2.1	Cultural & creative services exports, % total trade	2015	2016	WTO, Trade in Commercial Services
7.2.2	National feature films/mn pop. 15–69	2011	2015	UNESCO Institute for Statistics
7.3.3	Wikipedia edits/mn pop. 15–69	2014	2017	Wikimedia Foundation



Output rank	Input rank	Income	Region	Efficiency ratio	Population (mn)	GDP, PPP\$	GDP per capita, PPP\$	GII 2017 rank
4 ●	25	High	EUR	2 ●	0.6	64.4	106,373.8	12

				Score/Value	Rank					Score/Value	Rank
	Institutions			80.7	24		Business sophistication			57.7	7
1.1	Political environment.....			90.5	6	5.1	Knowledge workers.....			67.6	9
1.1.1	Political stability & safety*.....			97.2	3 ●◆	5.1.1	Knowledge-intensive employment, %.....			56.9	1 ●◆
1.1.2	Government effectiveness*.....			87.2	13	5.1.2	Firms offering formal training, % firms.....		n/a	n/a	
1.2	Regulatory environment.....			84.4	21	5.1.3	GERD performed by business, % GDP.....		0.6	31	◇
1.2.1	Regulatory quality*.....			88.2	13	5.1.4	GERD financed by business, %.....		47.1	29	
1.2.2	Rule of law*.....			91.0	12	5.1.5	Females employed w/advanced degrees, %.....		20.1	23	
1.2.3	Cost of redundancy dismissal, salary weeks.....			21.7	85	◇	5.2	Innovation linkages.....		53.8	7
1.3	Business environment.....			67.1	68	◇	5.2.1	University/industry research collaboration [†]		63.6	17
1.3.1	Ease of starting a business*.....			88.8	57	5.2.2	State of cluster development [†]		67.5	13	
1.3.2	Ease of resolving insolvency*.....			45.4	78	◇	5.2.3	GERD financed by abroad, %.....		3.4	66
							5.2.4	JV–strategic alliance deals/bn PPP\$ GDP.....		0.2	2 ●◆
							5.2.5	Patent families 2+ offices/bn PPP\$ GDP.....		5.7	7 ◆
							5.3	Knowledge absorption.....		51.8	11
							5.3.1	Intellectual property payments, % total trade.....		3.0	6 ◆
							5.3.2	High-tech net imports, % total trade.....		2.3	124 ○◇
							5.3.3	ICT services imports, % total trade.....		3.3	7 ◆
							5.3.4	FDI net inflows, % GDP.....		19.2	6 ◆
							5.3.5	Research talent, % in business enterprise.....		37.8	33
	Human capital & research			38.6	42	◇		Knowledge & technology outputs		47.9	14
2.1	Education.....			47.1	66	◇	6.1	Knowledge creation.....		47.7	13
2.1.1	Expenditure on education, % GDP.....			4.0	80	◇	6.1.1	Patents by origin/bn PPP\$ GDP.....		10.2	11
2.1.2	Government funding/pupil, secondary, % GDP/cap.....			20.0	52	◇	6.1.2	PCT patents by origin/bn PPP\$ GDP.....		7.7	1 ●◆
2.1.3	School life expectancy, years [Ⓔ]			14.0	65	◇	6.1.3	Utility models by origin/bn PPP\$ GDP.....		n/a	n/a
2.1.4	PISA scales in reading, maths & science.....			483.3	32	◇	6.1.4	Scientific & technical articles/bn PPP\$ GDP.....		10.5	49
2.1.5	Pupil-teacher ratio, secondary [Ⓔ]			9.4	23	◆	6.1.5	Citable documents H index.....		8.7	73
2.2	Tertiary education.....			34.7	51		6.2	Knowledge impact.....		39.3	52
2.2.1	Tertiary enrolment, % gross [Ⓔ]			19.7	90	○◇	6.2.1	Growth rate of PPP\$ GDP/worker, %.....		1.1	54
2.2.2	Graduates in science & engineering, % [Ⓔ]			13.8	84	○◇	6.2.2	New businesses/th pop. 15–64.....		15.4	8 ◆
2.2.3	Tertiary inbound mobility, % [Ⓔ]			45.9	1	●◆	6.2.3	Computer software spending, % GDP.....		0.2	71
2.3	Research & development (R&D).....			34.1	33	◇	6.2.4	ISO 9001 quality certificates/bn PPP\$ GDP.....		3.4	74
2.3.1	Researchers, FTE/mn pop.....			4,350.9	19		6.2.5	High- & medium-high-tech manufactures, % [Ⓔ]		0.2	61
2.3.2	Gross expenditure on R&D, % GDP.....			1.2	29	◇	6.3	Knowledge diffusion.....		56.6	7
2.3.3	Global R&D companies, top 3, mn US\$.....			54.9	25		6.3.1	Intellectual property receipts, % total trade.....		1.5	13
2.3.4	QS university ranking, average score top 3*.....			0.0	78	○◇	6.3.2	High-tech net exports, % total trade.....		0.8	71
							6.3.3	ICT services exports, % total trade.....		3.9	22
							6.3.4	FDI net outflows, % GDP.....		52.5	1 ●◆
	Infrastructure			58.8	23	◇		Creative outputs		57.9	2
3.1	Information & communication technologies (ICTs).....			79.9	21		7.1	Intangible assets.....		66.7	3 ●◆
3.1.1	ICT access*.....			95.4	1	●◆	7.1.1	Trademarks by origin/bn PPP\$ GDP.....		124.8	6 ◆
3.1.2	ICT use*.....			83.0	8		7.1.2	Industrial designs by origin/bn PPP\$ GDP.....		7.1	19
3.1.3	Government's online service*.....			71.7	40	◇	7.1.3	ICTs & business model creation [†]		82.2	5 ●
3.1.4	E-participation*.....			69.5	43	◇	7.1.4	ICTs & organizational model creation [†]		73.2	15
3.2	General infrastructure.....			43.8	46	◇	7.2	Creative goods & services.....		41.7	12
3.2.1	Electricity output, kWh/cap.....			1,341.4	90	○◇	7.2.1	Cultural & creative services exports, % total trade [Ⓔ]		4.8	1 ●◆
3.2.2	Logistics performance*.....			99.7	2	●◆	7.2.2	National feature films/mn pop. 15–69 [Ⓔ]		42.4	1 ●◆
3.2.3	Gross capital formation, % GDP.....			18.5	100	○◇	7.2.3	Entertainment & Media market/th pop. 15–69.....		n/a	n/a
3.3	Ecological sustainability.....			52.7	17		7.2.4	Printing & other media, % manufacturing.....		0.9	64
3.3.1	GDP/unit of energy use.....			14.3	15		7.2.5	Creative goods exports, % total trade.....		0.1	94
3.3.2	Environmental performance*.....			79.1	7		7.3	Online creativity.....		56.6	5 ●
3.3.3	ISO 14001 environmental certificates/bn PPP\$ GDP.....			1.4	56		7.3.1	Generic top-level domains (TLDs)/th pop. 15–69.....		92.0	4 ●◆
							7.3.2	Country-code TLDs/th pop. 15–69.....		62.8	9
							7.3.3	Wikipedia edits/mn pop. 15–69 [Ⓔ]		87.7	9
							7.3.4	Mobile app creation/bn PPP\$ GDP.....		12.3	56
	Market sophistication			45.1	70	◇					
4.1	Credit.....			29.3	91	○◇					
4.1.1	Ease of getting credit*.....			15.0	124	○◇					
4.1.2	Domestic credit to private sector, % GDP.....			102.4	27						
4.1.3	Microfinance gross loans, % GDP.....			n/a	n/a						
4.2	Investment.....			45.6	48						
4.2.1	Ease of protecting minority investors*.....			48.3	97	○◇					
4.2.2	Market capitalization, % GDP.....			93.6	13						
4.2.3	Venture capital deals/bn PPP\$ GDP.....			0.1	11						
4.3	Trade, competition, & market scale.....			60.3	66	◇					
4.3.1	Applied tariff rate, weighted mean, %.....			1.6	19						
4.3.2	Intensity of local competition [†]			71.9	48						
4.3.3	Domestic market scale, bn PPP\$.....			64.4	90	○◇					

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;

* an index; † a survey question. Ⓔ indicates that the country'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; see pagepage 75 of this appendix for details.