



## LUXEMBOURG

**19th** Luxembourg ranks 19th among the 132 economies featured in the GII 2022.

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.

The following table shows the rankings of Luxembourg over the past three years, noting that 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 Luxembourg in the GII 2022 is between ranks 15 and 20.

### Rankings for Luxembourg (2020–2022)

GIIYR	GII	Innovation inputs	Innovation outputs
2020	18	24	14
2021	23	26	18
2022	19	20	18

- Luxembourg performs better in innovation outputs than innovation inputs in 2022.
- This year Luxembourg ranks 20th in innovation inputs, higher than both 2021 and 2020.
- As for innovation outputs, Luxembourg ranks 18th. This position is the same as last year but lower than 2020.

**18th** Luxembourg ranks 18th among the 48 high-income group economies.

**11th** Luxembourg ranks 11th among the 39 economies in Europe.

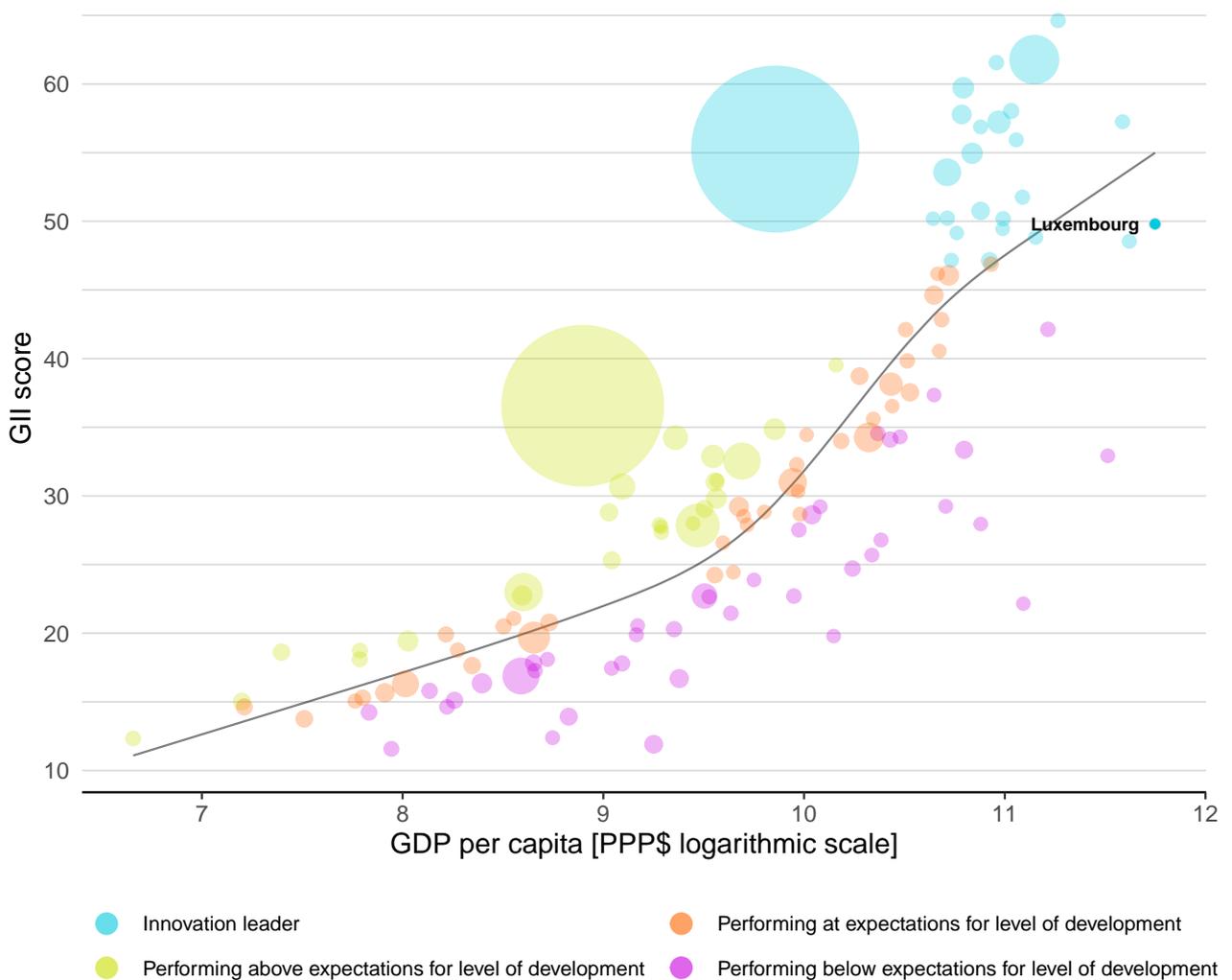


## EXPECTED VS. OBSERVED INNOVATION PERFORMANCE

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 performing below expectations.

Relative to GDP, Luxembourg's performance is above expectations for its level of development.

### The positive relationship between innovation and development



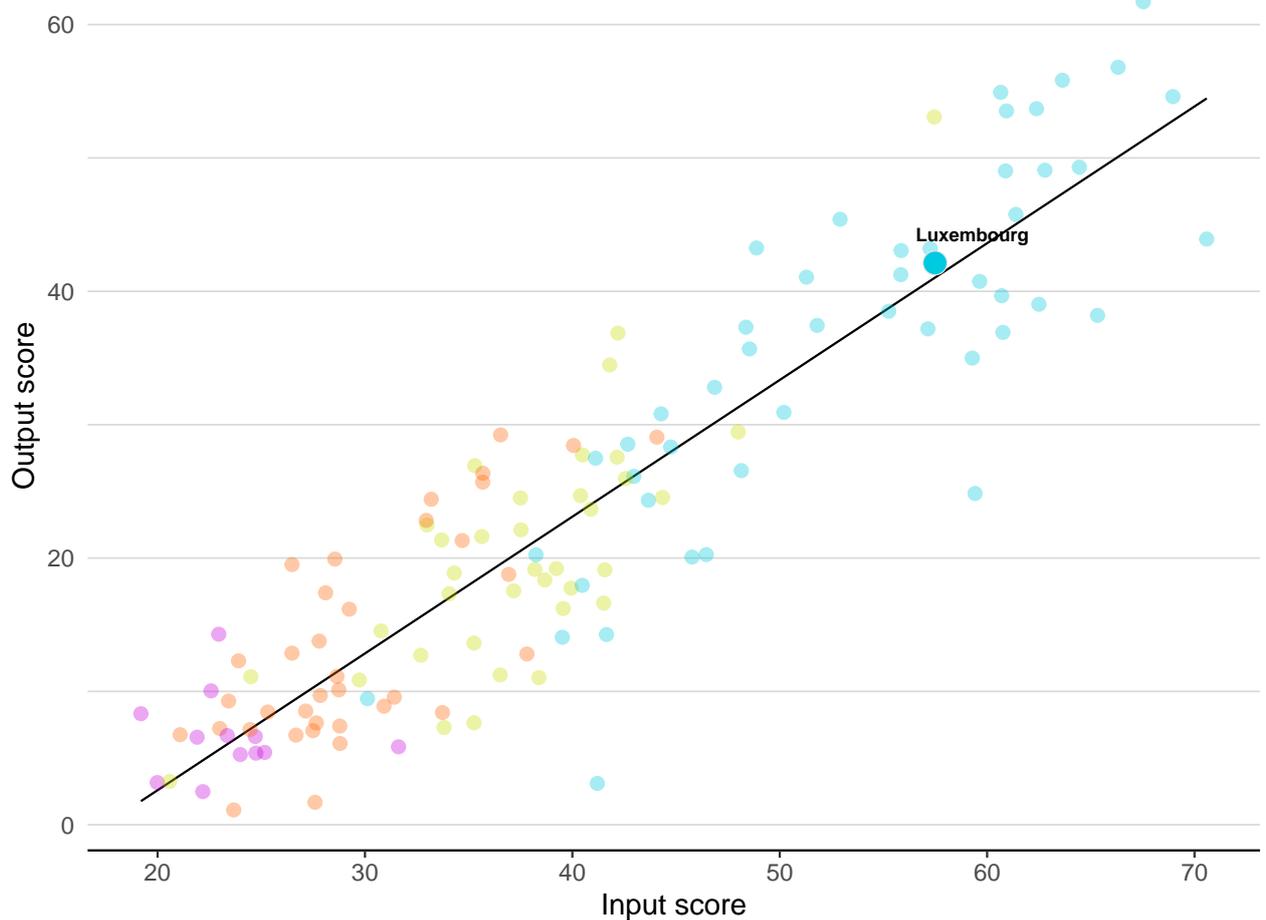


## EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

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

### Innovation input to output performance

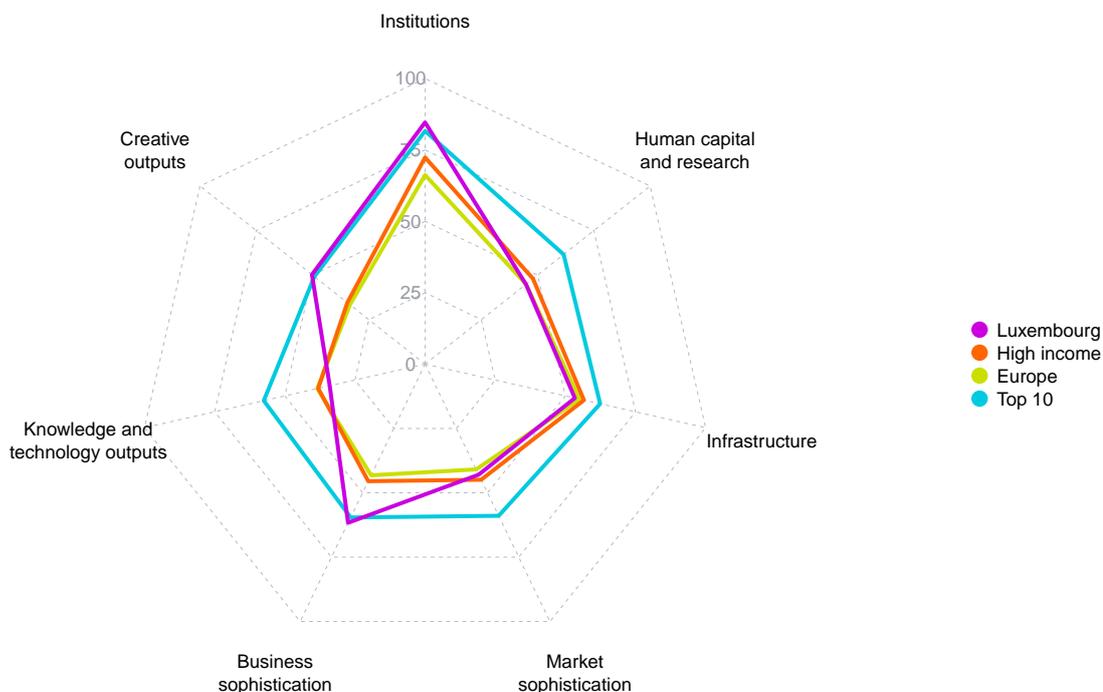


Income    ● High income    ● Upper middle    ● Lower middle    ● Low income    — Fitted line



## BENCHMARKING AGAINST OTHER HIGH-INCOME GROUP ECONOMIES AND EUROPE

### The seven GII pillar scores for Luxembourg



#### High-income group economies

Luxembourg performs above the high-income group average in three pillars, namely: Institutions; Business sophistication; and, Creative outputs.

#### Europe

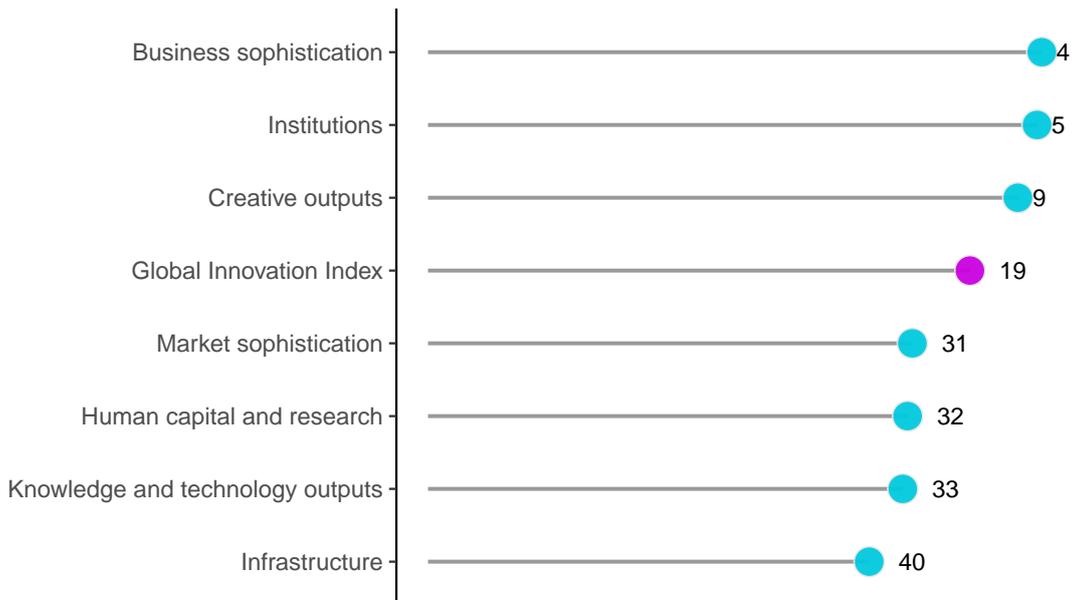
Luxembourg performs above the regional average in four pillars, namely: Institutions; Market sophistication; Business sophistication; and, Creative outputs.



## OVERVIEW OF RANKINGS IN THE SEVEN GII 2022 AREAS

Luxembourg performs best in Business sophistication and its weakest performance is in Infrastructure.

### The seven GII pillar ranks for Luxembourg



Note: The highest possible ranking in each pillar is 1.

The full WIPO Intellectual Property Statistics profile for Luxembourg can be found at:

[https://www.wipo.int/ipstats/en/statistics/country\\_profile/profile.jsp?code=LU](https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=LU).

## INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of the indicator strengths and weaknesses of Luxembourg in the GII 2022.

### Strengths and weaknesses for Luxembourg

Strengths			Weaknesses		
Code	Indicator name	Rank	Code	Indicator name	Rank
1.2.1	Regulatory quality	4	1.2.3	Cost of redundancy dismissal	94
1.3.1	Policies for doing business	2	2.1.1	Expenditure on education, % GDP	91
2.2.3	Tertiary inbound mobility, %	1	2.2.1	Tertiary enrolment, % gross	100
3.1.1	ICT access	5	2.2.2	Graduates in science and engineering, %	75
4.2.2	Venture capital investors, deals/bn PPP\$ GDP	1	2.3.4	QS university ranking, top 3	72
5.1.1	Knowledge-intensive employment, %	1	3.2.3	Gross capital formation, % GDP	117
5.3.1	Intellectual property payments, % total trade	5	4.3.3	Domestic market scale, bn PPP\$	90
5.3.4	FDI net inflows, % GDP	4	5.3.2	High-tech imports, % total trade	131
7.2.1	Cultural and creative services exports, % total trade	1	6.2.1	Labor productivity growth, %	101
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	5	7.2.5	Creative goods exports, % total trade	93
7.3.3	GitHub commit pushes received/mn pop. 15–69	4			

## Luxembourg

19

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP\$ (bn)	GDP per capita, PPP\$
18	20	High	EUR	0.6	80.8	126,569

		Score/ Value	Rank			Score/ Value	Rank
 <b>Institutions</b>		84.6	5 ●	 <b>Business sophistication</b>		61.7	4 ●
1.1	<b>Political environment</b>	90.1	5 ●	5.1	<b>Knowledge workers</b>	68.9	7
1.1.1	Political and operational stability*	90.9	4	5.1.1	Knowledge-intensive employment, %	63.6	1 ● ◆
1.1.2	Government effectiveness*	89.4	7	5.1.2	Firms offering formal training, %	66.1	5
1.2	<b>Regulatory environment</b>	82.4	26	5.1.3	GERD performed by business, % GDP	0.6	36 ◇
1.2.1	Regulatory quality*	90.9	4 ●	5.1.4	GERD financed by business, %	51.3	27
1.2.2	Rule of law*	92.6	10	5.1.5	Females employed w/advanced degrees, %	26.2	16
1.2.3	Cost of redundancy dismissal	21.7	94 ○ ◇	5.2	<b>Innovation linkages</b>	50.1	15
1.3	<b>Business environment</b>	81.4	6 ◆	5.2.1	University-industry R&D collaboration†	62.1	20
1.3.1	Policies for doing business†	89.7	2 ● ◆	5.2.2	State of cluster development and depth†	61.9	22
1.3.2	Entrepreneurship policies and culture*	73.1	11	5.2.3	GERD financed by abroad, % GDP	0.0	50
 <b>Human capital and research</b>		44.8	32 ◇	5.2.4	Joint venture/strategic alliance deals/bn PPP\$ GDP	0.2	11
2.1	<b>Education</b>	53.9	60 ◇	5.2.5	Patent families/bn PPP\$ GDP	4.3	10
2.1.1	Expenditure on education, % GDP	3.6	91 ○ ◇	5.3	<b>Knowledge absorption</b>	66.0	2 ● ◆
2.1.2	Government funding/pupil, secondary, % GDP/cap	20.8	48	5.3.1	Intellectual property payments, % total trade	4.0	5 ● ◆
2.1.3	School life expectancy, years	14.4	66 ◇	5.3.2	High-tech imports, % total trade	1.6	131 ○ ◇
2.1.4	PISA scales in reading, maths and science	476.7	35 ◇	5.3.3	ICT services imports, % total trade	4.7	6 ◆
2.1.5	Pupil-teacher ratio, secondary	8.6	15 ◆	5.3.4	FDI net inflows, % GDP	27.4	4 ● ◆
2.2	<b>Tertiary education</b>	47.6	17	5.3.5	Research talent, % in businesses	40.5	35 ◇
2.2.1	Tertiary enrolment, % gross	18.4	100 ○ ◇	 <b>Knowledge and technology outputs</b>		34.0	33 ◇
2.2.2	Graduates in science and engineering, %	19.2	75 ○ ◇	6.1	<b>Knowledge creation</b>	44.6	19
2.2.3	Tertiary inbound mobility, %	48.6	1 ● ◆	6.1.1	Patents by origin/bn PPP\$ GDP	7.1	14
2.3	<b>Research and development (R&amp;D)</b>	33.0	35 ◇	6.1.2	PCT patents by origin/bn PPP\$ GDP	4.2	7
2.3.1	Researchers, FTE/mn pop.	4,920.3	18	6.1.3	Utility models by origin/bn PPP\$ GDP	n/a	n/a
2.3.2	Gross expenditure on R&D, % GDP	1.1	37 ◇	6.1.4	Scientific and technical articles/bn PPP\$ GDP	20.7	44 ◇
2.3.3	Global corporate R&D investors, top 3, mn USD	60.4	22	6.1.5	Citable documents H-index	11.6	64 ◇
2.3.4	QS university ranking, top 3*	0.0	72 ○ ◇	6.2	<b>Knowledge impact</b>	33.0	47 ◇
 <b>Infrastructure</b>		53.4	40 ◇	6.2.1	Labor productivity growth, %	-0.8	101 ○ ◇
3.1	<b>Information and communication technologies (ICTs)</b>	81.9	39 ◇	6.2.2	New businesses/th pop. 15-64	17.2	6 ◆
3.1.1	ICT access*	98.0	5 ● ◆	6.2.3	Software spending, % GDP	0.2	74 ◇
3.1.2	ICT use*	82.8	14	6.2.4	ISO 9001 quality certificates/bn PPP\$ GDP	2.2	82 ◇
3.1.3	Government's online service*	76.5	49 ◇	6.2.5	High-tech manufacturing, %	n/a	n/a
3.1.4	E-participation*	70.2	70 ◇	6.3	<b>Knowledge diffusion</b>	24.3	61 ◇
3.2	<b>General infrastructure</b>	33.3	55 ◇	6.3.1	Intellectual property receipts, % total trade	1.5	15
3.2.1	Electricity output, GWh/mn pop.	1,952.4	81 ◇	6.3.2	Production and export complexity	n/a	n/a
3.2.2	Logistics performance*	73.5	24	6.3.3	High-tech exports, % total trade	0.5	88 ◇
3.2.3	Gross capital formation, % GDP	15.6	117 ○ ◇	6.3.4	ICT services exports, % total trade	3.1	40
3.3	<b>Ecological sustainability</b>	44.9	22	 <b>Creative outputs</b>		50.3	9
3.3.1	GDP/unit of energy use	19.1	10	7.1	<b>Intangible assets</b>	51.7	17
3.3.2	Environmental performance*	72.3	6	7.1.1	Intangible asset intensity, top 15, %	57.9	43 ◇
3.3.3	ISO 14001 environmental certificates/bn PPP\$ GDP	1.2	67	7.1.2	Trademarks by origin/bn PPP\$ GDP	67.5	31
 <b>Market sophistication</b>		42.9	31 ◇	7.1.3	Global brand value, top 5,000, % GDP	120.3	15
4.1	<b>Credit</b>	40.0	30	7.1.4	Industrial designs by origin/bn PPP\$ GDP	6.2	18
4.1.1	Finance for startups and scaleups*	40.4	40 ◇	7.2	<b>Creative goods and services</b>	39.8	10
4.1.2	Domestic credit to private sector, % GDP	105.8	25	7.2.1	Cultural and creative services exports, % total trade	5.6	1 ● ◆
4.1.3	Loans from microfinance institutions, % GDP	n/a	n/a	7.2.2	National feature films/mn pop. 15-69	8.7	6
4.2	<b>Investment</b>	42.8	13	7.2.3	Entertainment and media market/th pop. 15-69	n/a	n/a
4.2.1	Market capitalization, % GDP	67.6	26	7.2.4	Printing and other media, % manufacturing	0.7	66
4.2.2	Venture capital investors, deals/bn PPP\$ GDP	1.4	1 ● ◆	7.2.5	Creative goods exports, % total trade	0.1	93 ○
4.2.3	Venture capital recipients, deals/bn PPP\$ GDP	0.1	34	7.3	<b>Online creativity</b>	57.9	4 ● ◆
4.2.4	Venture capital received, value, % GDP	0.0	25	7.3.1	Generic top-level domains (TLDs)/th pop. 15-69	84.8	5 ● ◆
4.3	<b>Trade, diversification, and market scale</b>	46.0	89 ◇	7.3.2	Country-code TLDs/th pop. 15-69	68.5	7
4.3.1	Applied tariff rate, weighted avg., %	1.5	20	7.3.3	GitHub commit pushes received/mn pop. 15-69	62.8	4 ●
4.3.2	Domestic industry diversification	n/a	n/a	7.3.4	Mobile app creation/bn PPP\$ GDP	15.3	23
4.3.3	Domestic market scale, bn PPP\$	80.8	90 ○				

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/global\\_innovation\\_index/en/2022](https://www.wipo.int/global_innovation_index/en/2022). 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 indicators that are either missing or outdated for Luxembourg.

### Missing data for Luxembourg

Code	Indicator name	Economy year	Model year	Source
4.1.3	Loans from microfinance institutions, % GDP	n/a	2020	International Monetary Fund, Financial Access Survey (FAS)
4.3.2	Domestic industry diversification	n/a	2019	United Nations Industrial Development Organization
6.1.3	Utility models by origin/bn PPP\$ GDP	n/a	2020	World Intellectual Property Organization
6.2.5	High-tech manufacturing, %	n/a	2019	United Nations Industrial Development Organization
6.3.2	Production and export complexity	n/a	2019	Harvard University, Growth Lab
7.2.3	Entertainment and media market/th pop. 15–69	n/a	2021	PwC, GEMO

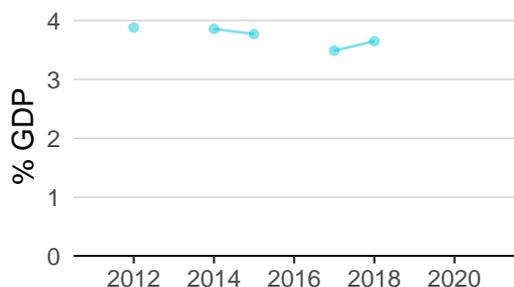
### Outdated data for Luxembourg

Code	Indicator name	Economy year	Model year	Source
2.1.1	Expenditure on education, % GDP	2018	2020	UNESCO Institute for Statistics
6.2.2	New businesses/th pop. 15–64	2018	2020	World Bank, Entrepreneurship Database

## LUXEMBOURG'S INNOVATION SYSTEM

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

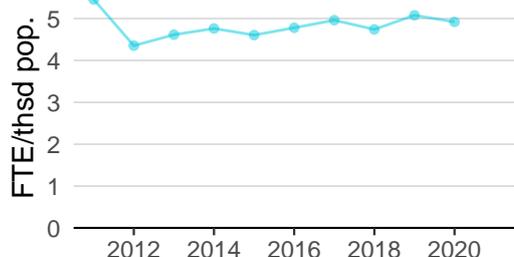
### Innovation inputs



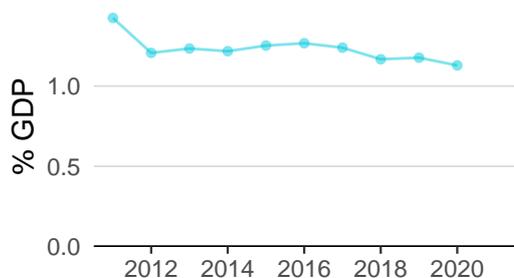
**2.1.1 Expenditure on education** was equal to 3.6% GDP in 2018—up by 5 percentage points from the year prior—and equivalent to an indicator rank of 91.



**2.2.2 Graduates in science and engineering** was equal to 19.2% of tert. grads in 2020—up by 2 percentage points from the year prior—and equivalent to an indicator rank of 75.



**2.3.1 Researchers** was equal to 4.9 FTE/thsd pop. in 2020—down by 3 percentage points from the year prior—and equivalent to an indicator rank of 18.



**2.3.2 Gross expenditure on R&D** was equal to 1.1% GDP in 2020—down by 4 percentage points from the year prior—and equivalent to an indicator rank of 37.



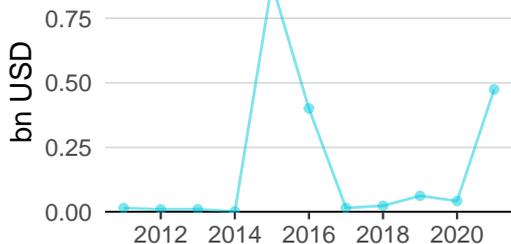
**2.3.4 QS university ranking** was equal to 0.0 in 2021—effectively unchanged from the year prior—and equivalent to an indicator rank of 72.



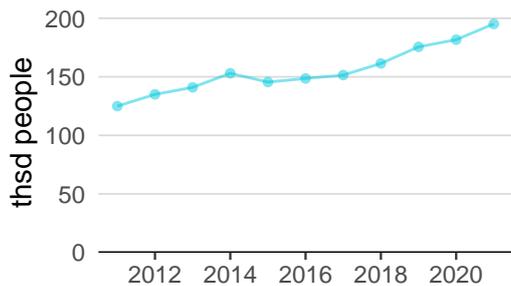
**3.1.1 ICT access** was equal to 9.8 in 2020 and equivalent to an indicator rank of 5.



**4.2.4 Venture capital received** was equal to 0.5 bn USD in 2021—up by 1017 percentage points from the year prior—and equivalent to an indicator rank of 25.



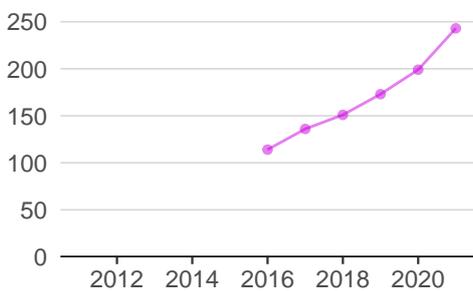
**5.1.1 Knowledge-intensive employment** was equal to 195.2 thsd people in 2021—up by 7 percentage points from the year prior—and equivalent to an indicator rank of 1.



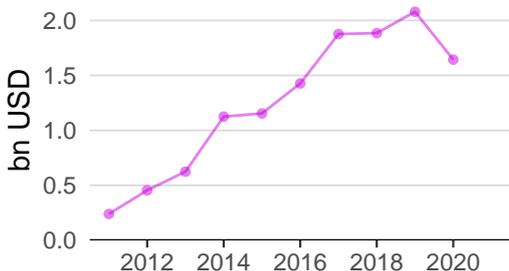
## Innovation outputs



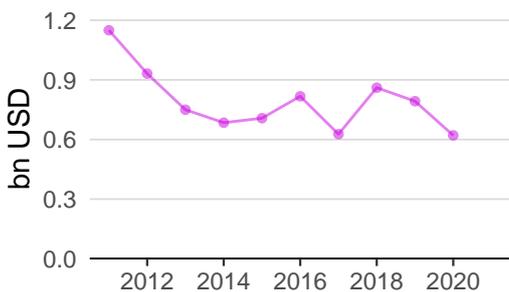
**6.1.1 Patents by origin** was equal to 523.0 in 2020—down by 4 percentage points from the year prior—and equivalent to an indicator rank of 14.



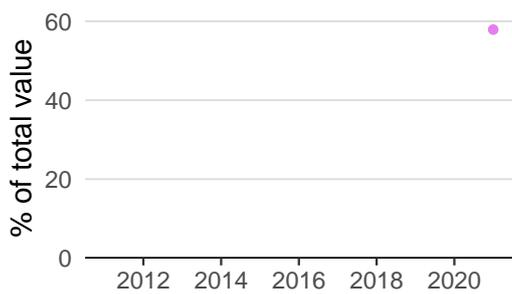
**6.1.5 Citable documents H-index** was equal to 243.0 in 2021—up by 22 percentage points from the year prior—and equivalent to an indicator rank of 64.



**6.3.1 Intellectual property receipts** was equal to 1.6 bn USD in 2020—down by 21 percentage points from the year prior—and equivalent to an indicator rank of 15.



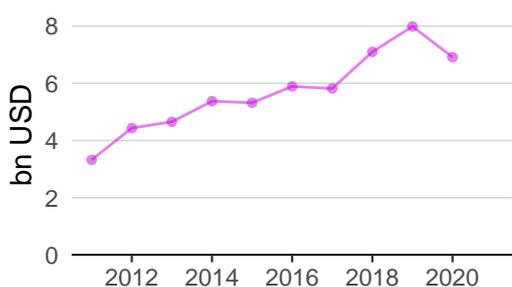
**6.3.3 High-tech exports** was equal to 0.6 bn USD in 2020—down by 22 percentage points from the year prior—and equivalent to an indicator rank of 88.



**7.1.1 Intangible asset intensity** was equal to 57.9% of total value in 2021 and equivalent to an indicator rank of 43.



**7.1.3 Global brand value** was equal to 10.1 bn USD in 2021—up by 31 percentage points from the year prior—and equivalent to an indicator rank of 15.



**7.2.1 Cultural and creative services exports** was equal to 6.9 bn USD in 2020—down by 13 percentage points from the year prior—and equivalent to an indicator rank of 1.

## LUXEMBOURG'S INNOVATION TOP PERFORMERS

### 2.3.3 Global corporate R&D investors

Firm	Industry	R&D	R&D Growth	R&D Intensity	Rank
		[mn EUR]	[%]	[%]	
SPOTIFY	Software & Computer Services	819	32.1	10.4	197
ARCELORMITTAL	Industrial Metals & Mining	200	-18.6	0.5	658
STABILUS	General Industrials	42	3.0	5.1	2,259

Source: European Commission's Joint Research Centre (<https://iri.jrc.ec.europa.eu/scoreboard/2021-eu-industrial-rd-investment-scoreboard>).  
Note: European Commission's Joint Research Centre ranks the top 2,500 firms by R&D investment annually.

### 2.3.4 QS university ranking

University	Score	Rank
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No observations

Source: QS Quacquarelli Symonds Ltd (<https://www.topuniversities.com/university-rankings/world-university-rankings/2022>).

### 7.1.1 Intangible asset intensity, top 15

Firm	Rank
EUROFINS SCIENTIFIC	1
RTL GROUP	2
SES	3

Source: Brand Finance (<https://brandirectory.com/reports/gift-2021>).  
Note: Brand Finance only provides within economy ranks.

### 7.1.3 Global brand value, top 5,000

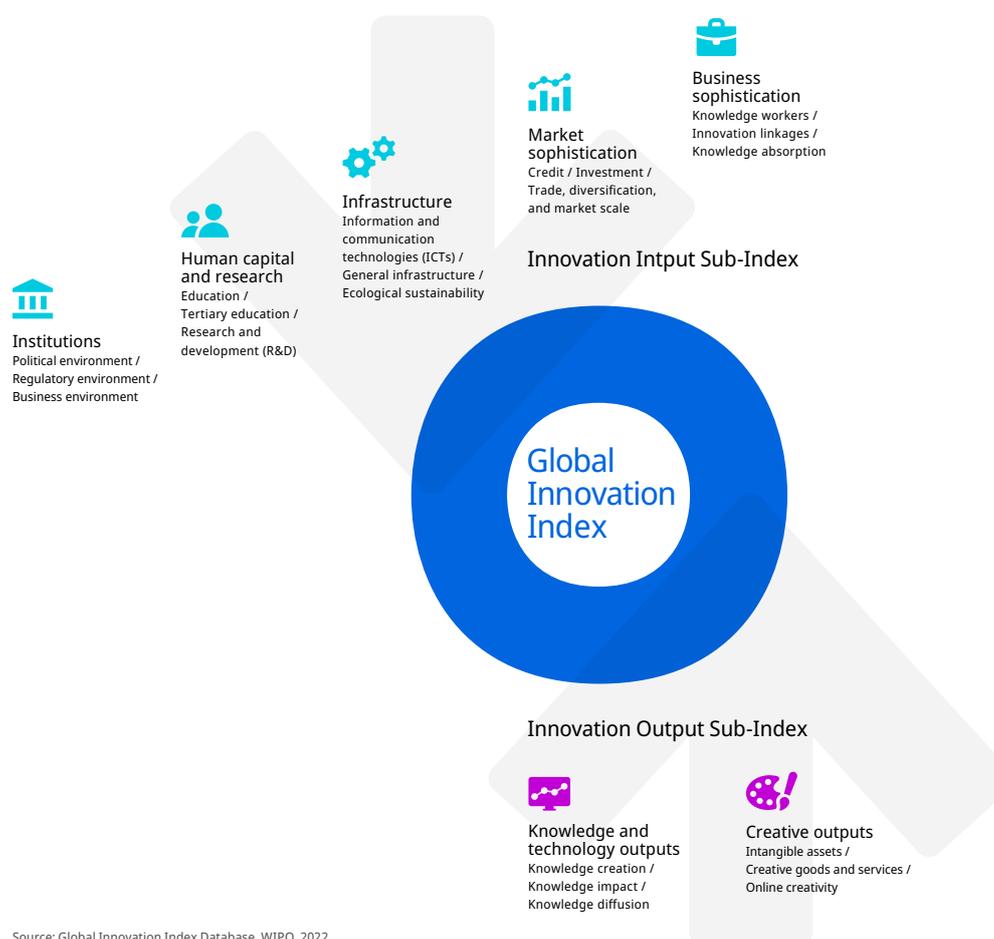
Brand	Industry	Rank
ARCELORMITTAL	Mining, Iron & Steel	1
EUROFINS SCIENTIFIC	Healthcare	2
RTL	Media	3

Source: Brand Finance (<https://brandirectory.com>).  
Note: Rank corresponds to within economy ranks.

## 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.



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.