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.

<table>
<thead>
<tr>
<th>Country</th>
<th>GII 2019 Rank</th>
<th>Innovation Inputs 2019</th>
<th>Innovation Outputs 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxembourg</td>
<td>18</td>
<td>23</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>24</td>
<td>4</td>
</tr>
</tbody>
</table>

- 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.

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.

LUXEMBOURG’S INNOVATION STRENGTHS AND WEAKNESSES

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

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Code</th>
<th>Indicator name</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative outputs</td>
<td>2.2.1</td>
<td>Tertiary enrolment, % gross</td>
<td>94</td>
</tr>
<tr>
<td>Business sophistication</td>
<td>2.2.2</td>
<td>Graduates in science &amp; engineering, %</td>
<td>74</td>
</tr>
<tr>
<td>Knowledge &amp; technology outputs</td>
<td>2.2.3</td>
<td>Tertiary inbound mobility, %</td>
<td>1</td>
</tr>
<tr>
<td>Global Innovation Index 2019</td>
<td>3.1</td>
<td>Information &amp; communication technologies (ICTs)</td>
<td>5</td>
</tr>
<tr>
<td>Institutions</td>
<td>3.1.1</td>
<td>ICT access*</td>
<td>1</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>3.1.1.1</td>
<td>Knowledge-intensive employment, %</td>
<td>2</td>
</tr>
<tr>
<td>Human capital &amp; research</td>
<td>5.1</td>
<td>Knowledge absorption</td>
<td>4</td>
</tr>
<tr>
<td>Market sophistication</td>
<td>5.1.1</td>
<td>Intellectual property payments, % total trade</td>
<td>1</td>
</tr>
<tr>
<td>5.2</td>
<td>5.1.2</td>
<td>FDI net inflows, % GDP, 3-year average</td>
<td>3</td>
</tr>
<tr>
<td>5.3</td>
<td>5.1.3</td>
<td>FDI net outflows, % GDP, 3-year average</td>
<td>1</td>
</tr>
<tr>
<td>4.1.1</td>
<td>6.1.2</td>
<td>PCT patents by origin/bn PPP$ GDP</td>
<td>1</td>
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<tr>
<td>4.2.1</td>
<td>6.3.4</td>
<td>Growth rate of PPP$ GDP/worker, % 3-year average</td>
<td>101</td>
</tr>
<tr>
<td>7.2</td>
<td>7.2.1</td>
<td>Creative outputs</td>
<td>2</td>
</tr>
<tr>
<td>7.2.2</td>
<td>7.2.2</td>
<td>Cultural &amp; creative services exports, % total trade</td>
<td>1</td>
</tr>
<tr>
<td>7.3</td>
<td>7.3</td>
<td>Online creativity</td>
<td>1</td>
</tr>
<tr>
<td>7.3.1</td>
<td>7.3.1</td>
<td>Generic top-level domains (TLDs)/th pop. 15–69</td>
<td>4</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
<th>Code</th>
<th>Indicator name</th>
<th>Rank</th>
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<tbody>
<tr>
<td>2.2.1</td>
<td>2.2.2</td>
<td>Graduates in science &amp; engineering, %</td>
<td>74</td>
</tr>
<tr>
<td>2.2.3</td>
<td>2.3.4</td>
<td>QS university ranking, average score top 3*</td>
<td>78</td>
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<tr>
<td>3.1.1</td>
<td>3.2.1</td>
<td>Electricity output, kWh/mn pop</td>
<td>88</td>
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<tr>
<td>3.1.2</td>
<td>3.2.2</td>
<td>Gross capital formation, % GDP</td>
<td>106</td>
</tr>
<tr>
<td>3.2.3</td>
<td>4.1.1</td>
<td>Ease of getting credit*</td>
<td>124</td>
</tr>
<tr>
<td>4.2.1</td>
<td>4.2.2</td>
<td>Ease of protecting minority investors*</td>
<td>99</td>
</tr>
<tr>
<td>5.1.1</td>
<td>5.3.2</td>
<td>High-tech imports, % total trade</td>
<td>127</td>
</tr>
<tr>
<td>6.2.1</td>
<td>6.2.2</td>
<td>Growth rate of PPP$ GDP/worker, % 3-year average</td>
<td>101</td>
</tr>
<tr>
<td>7.2.5</td>
<td>7.3.1</td>
<td>Creative goods exports, % total trade</td>
<td>100</td>
</tr>
</tbody>
</table>

*The highest possible ranking in each pillar is 1.
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).
### LUXEMBOURG

#### Output rank 11  
#### Input rank 23  
#### Income High  
#### Region EUR  
#### Population (mn) 0.6  
#### GDP, PPP$ 66.1  
#### GDP per capita, PPP$ 106,704.9  

#### GII 2019 rank 18  
#### Gil 2018 rank 15  

#### Score/Value 80.7 24  

##### 1. INSTITUTIONS  
1.1 Political environment…………………………………… 90.4 11  
1.1.1 Political and operational stability*………………………… 95.5 2 ○  
1.1.2 Government effectiveness*………………………… 87.3 13 ○  
1.2 Regulatory environment……………………………… 84.5 22  
1.2.1 Regulatory quality*………………………… 87.3 13 ○  
1.2.2 Rule of law*………………………… 92.3 11 ○  
1.2.3 Cost of redun…...…… 217 91 ○  
1.3 Business environment………………………… 67.1 74 ○  
1.3.1 Ease of starting a business*………………………… 88.7 59 ○  
1.3.2 Ease of resolving insolvency*………………………… 45.5 81 ○  

##### 2. HUMAN CAPITAL & RESEARCH  
2.1 Education…………………………………… 48.3 66 ○  
2.1.1 Expenditure on education, % GDP………………………… 3.9 82 ○  
2.1.2 Government funding/pupil, secondary, % GDP/cap……………… 19.2 52 ○  
2.1.3 School life expectancy, years………………………… 14.2 68 ○  
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 inb….…… 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 & RO…...…… 58.7 23 ○  
2.3.4 QS university ranking, average score top 3*………………………… 0.0 78 ○  

##### 3. INFRASTRUCTURE  
3.1 Information & communication technologies (ICTs)………………………… 90.7 5 ○  
3.1.1 ICT access*………………………… 94.2 1 ○  
3.1.2 ICT use………………………… 82.4 10 ○  
3.1.3 Government’s online service………………………… 92.4 22 ○  
3.1.4 E-participation*………………………… 93.8 19 ○  
3.2 General infrastructure………………………… 32.2 74 ○  
3.2.1 Electricity output, kWh/mn pop………………………… 1482.0 88 ○  
3.2.2 Logistics performance*………………………… 73.3 24 ○  
3.2.3 Gross capital formation, % GDP………………………… 17.4 106 ○  
3.3 Ecological sustainability………………………… 53.3 17 ○  
3.3.1 GDP/unit of energy use………………………… 13.9 17 ○  
3.3.2 Environmental performance*………………………… 79.1 7 ○  
3.3.3 ISO 14001 environmental certificates/bn PPP$ GDP………………………… 1.9 49 ○  

##### 4. MARKET SOPHISTICATION………………………… 46.9 68 ○  
4.1 Credit………………………… 32.8 77 ○  
4.1.1 Ease of getting credit*………………………… 15.0 124 ○  
4.1.2 Domestic credit to private sector, % GDP………………………… 105.9 21 ○  
4.1.3 Microfinance gross loans, % GDP………………………… n/a n/a ○  
4.2 Investment………………………… 47.2 45 ○  
4.2.1 Ease of protecting minority investors*………………………… 48.3 99 ○  
4.2.2 Market capitalization, % GDP………………………… 98.5 12 ○  
4.2.3 Venture capital deal/bn PPP$ GDP………………………… 0.2 8 ○  
4.3 Trade, competition, & market scale………………………… 60.7 65 ○  
4.3.1 Applied tariff rate, weighted avg, %………………………… 1.8 23 ○  
4.3.2 Intensity of local competition*………………………… 72.4 43 ○  
4.3.3 Domestic market scale, bn PPP$………………………… 66.1 92 ○  

##### 5. BUSINESS SOPHISTICATION………………………… 60.7 8 ○  
5.1 Knowledge workers………………………… 66.1 16 ○  
5.1.1 Knowledge-intensive employment, %………………………… 55.9 2 ○  
5.1.2 Firms offering formula training, % firms………………………… n/a n/a ○  
5.1.3 GERD performed by business, % GDP………………………… 0.7 28 ○  
5.1.4 GERD financed by business, % GDP………………………… 471.3 32 ○  
5.1.5 Females employed w/advanced degrees, %………………………… 177 30 ○  
5.2 Innovation linkages………………………… 56.8 6 ○  
5.2.1 University/industry research collaboration*………………………… 68.2 13 ○  
5.2.2 State of cluster development………………………… 67.0 13 ○  
5.2.3 GERD financed by abroad, % GDP………………………… 3.4 69 ○  
5.2.4 JV-strategic alliance deal/bn PPP$ GDP………………………… 0.1 11 ○  
5.2.5 Patent families 2+ offices/bn PPP$ GDP………………………… 8.2 4 ○  
5.3 Knowledge absorption………………………… 59.1 4 ○  
5.3.1 Intellectual property payments, % total trade………………………… 4.3 1 ○  
5.3.2 High-tech imports, % total trade………………………… 19 127 ○  
5.3.3 ICT services imports, % total trade………………………… 3.1 8 ○  
5.3.4 FDI net inflows, % GDP………………………… 35.7 3 ○  
5.3.5 Research talent, % in business enterprise………………………… 41.9 32 ○  

##### 6. KNOWLEDGE & TECHNOLOGY OUTPUTS………………………… 42.2 18 ○  
6.1 Knowledge creation………………………… 43.5 15 ○  
6.1.1 Patents by origin/bn PPP$ GDP………………………… 11.5 9 ○  
6.1.2 PCT patents by origin/bn PPP$ GDP………………………… 5.9 1 ○  
6.1.3 Utility models by origin/bn PPP$ GDP………………………… n/a n/a ○  
6.1.4 Scientific & technical articles/bn PPP$ GDP………………………… 12.1 41 ○  
6.1.5 Citable documents H-index……………… 9.1 74 ○  
6.2 Knowledge impact………………………… 34.9 74 ○  
6.2.1 Growth rate of PPPGDP……………… 2.6 25 ○  
6.2.2 New/businesses/15-64……………… 15.4 8 ○  
6.2.3 Computer software spending, % GDP………………………… 0.2 69 ○  
6.2.4 ISO 9000 quality certificates/bn PPP$ GDP………………………… 3.4 72 ○  
6.2.5 High- & medium-high-tech manufactures, %……………… 0.1 68 ○  
6.3 Knowledge diffusion………………………… 48.0 11 ○  
6.3.1 Intellectual property receipts, % total trade………………………… 2.0 11 ○  
6.3.2 High-tech net exports, % total trade………………………… 0.6 76 ○  
6.3.3 ICT services exports, % total trade………………………… 3.5 24 ○  
6.3.4 FDI net outflows, % GDP………………………… 63.5 1 ○  

##### 7. CREATIVE OUTPUTS………………………… 56.2 2 ○  
7.1 Intangible assets………………………… 59.4 9 ○  
7.1.1 Trademarks by origin/bn PPP$ GDP………………………… 102.9 11 ○  
7.1.2 Industrial designs by origin/bn PPP$ GDP………………………… 4.6 28 ○  
7.1.3 ICTs & business model creation*………………………… 80.3 9 ○  
7.1.4 ICTs & organizational model creation*………………………… 72.2 15 ○  
7.2 Creative goods & services………………………… 38.6 9 ○  
7.2.1 Cultural & creative services exports, % total trade……………… 4.0 1 ○  
7.2.2 National feature films/mn pop 15-69……………… 42.4 1 ○  
7.2.3 Entertainment & Media market/mn pop 15-69……………… n/a n/a ○  
7.2.4 Printing & other media, % manufacturing……………… 0.9 73 ○  
7.2.5 Creative goods exports, % total trade………………………… 0.1 100 ○  
7.3 Online creativity………………………… 67.6 1 ○  
7.3.1 Generic top-level domains (TLDs)/mh pop 15-69……………… 90.8 4 ○  
7.3.2 Country-code TLDs/mh pop 15-69……………… 63.3 9 ○  
7.3.3 Wikipedia edits/mn pop 15-69……………… 87.7 9 ○  
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

<table>
<thead>
<tr>
<th>Code</th>
<th>Indicator name</th>
<th>Country year</th>
<th>Model year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.3</td>
<td>Microfinance gross loans, % GDP</td>
<td>n/a</td>
<td>2017</td>
<td>Microfinance Information Exchange</td>
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<tr>
<td>5.1.2</td>
<td>Firms offering formal training, % firms</td>
<td>n/a</td>
<td>2013</td>
<td>World Bank</td>
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<tr>
<td>6.1.3</td>
<td>Utility models by origin/bn PPP$ GDP</td>
<td>n/a</td>
<td>2017</td>
<td>World Intellectual Property Organization</td>
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<tr>
<td>7.2.3</td>
<td>Entertainment &amp; Media market/th pop. 15–69</td>
<td>n/a</td>
<td>2017</td>
<td>PwC</td>
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### Outdated data

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<th>Model year</th>
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<tbody>
<tr>
<td>2.1.5</td>
<td>Pupil-teacher ratio, secondary</td>
<td>2016</td>
<td>2017</td>
<td>UNESCO Institute for Statistics</td>
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<tr>
<td>2.2.1</td>
<td>Tertiary enrolment, % gross</td>
<td>2016</td>
<td>2017</td>
<td>UNESCO Institute for Statistics</td>
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<td>5.1.4</td>
<td>GERD financed by business, %</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators</td>
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<tr>
<td>5.2.3</td>
<td>GERD financed by abroad, %</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics</td>
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<tr>
<td>7.2.2</td>
<td>National feature films/mn pop. 15–69</td>
<td>2011</td>
<td>2017</td>
<td>UNESCO Institute for Statistics</td>
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<tr>
<td>7.3.3</td>
<td>Wikipedia edits/mn pop. 15–69</td>
<td>2014</td>
<td>2017</td>
<td>Wikimedia Foundation</td>
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</table>
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.