Global Innovation Index 2021

LUXEMBOURG

23rd Luxembourg ranks 23rd among the 132 economies featured in the GII 2021.

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 2021 is between ranks 21 and 24.

Rankings for Luxembourg (2019–2021)

	GII	Innovation inputs	Innovation outputs
2021	23	26	18
2020	18	24	14
2019	18	23	11

- Luxembourg performs better in innovation outputs than innovation inputs in 2021.
- This year Luxembourg ranks 26th in innovation inputs, lower than both 2020 and 2019.
- As for innovation outputs, Luxembourg ranks 18th. This position is lower than both 2020 and 2019.

22nd Luxembourg ranks 22nd among the 51 high-income group economies.

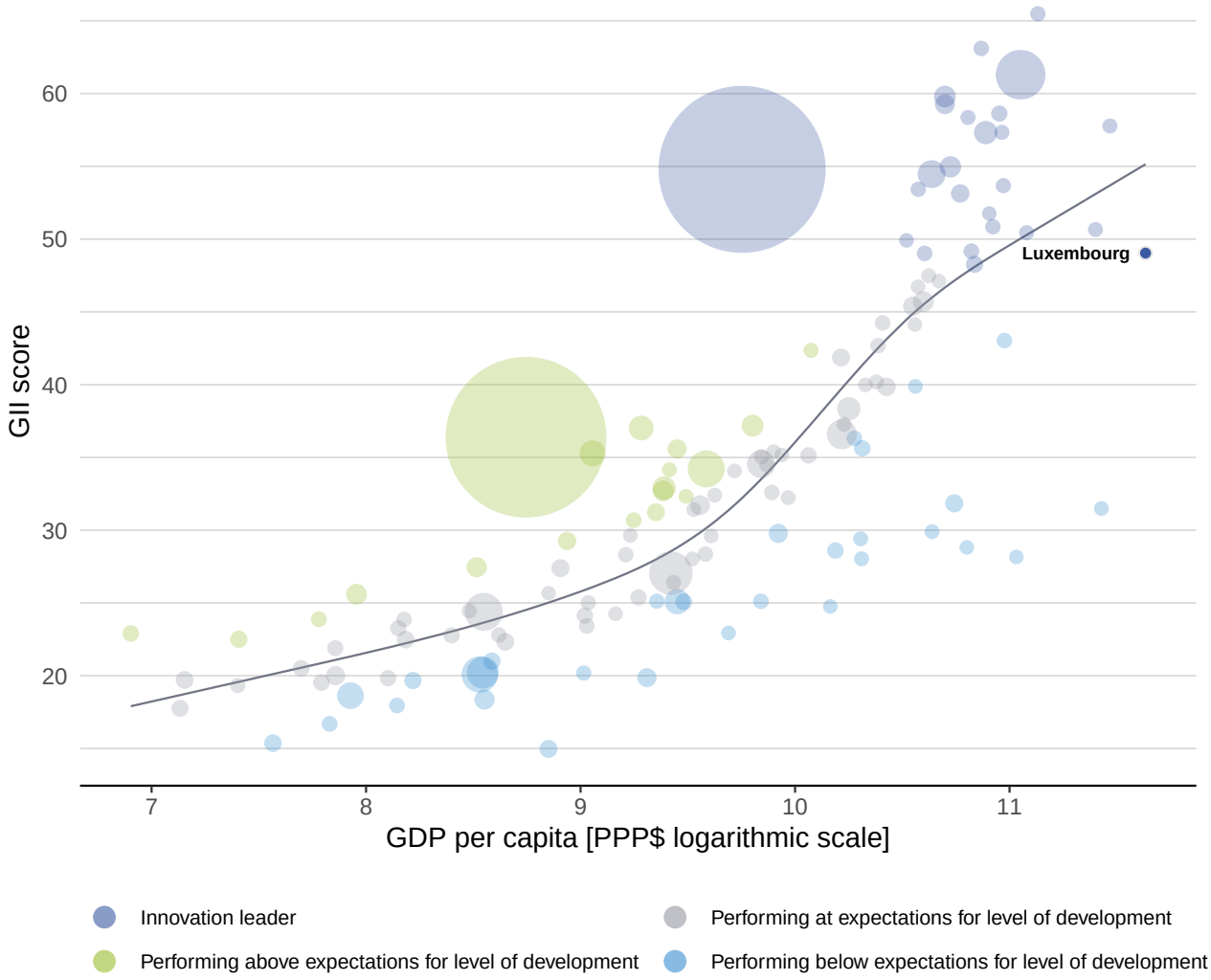
15th Luxembourg ranks 15th among the 39 economies in Europe.

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

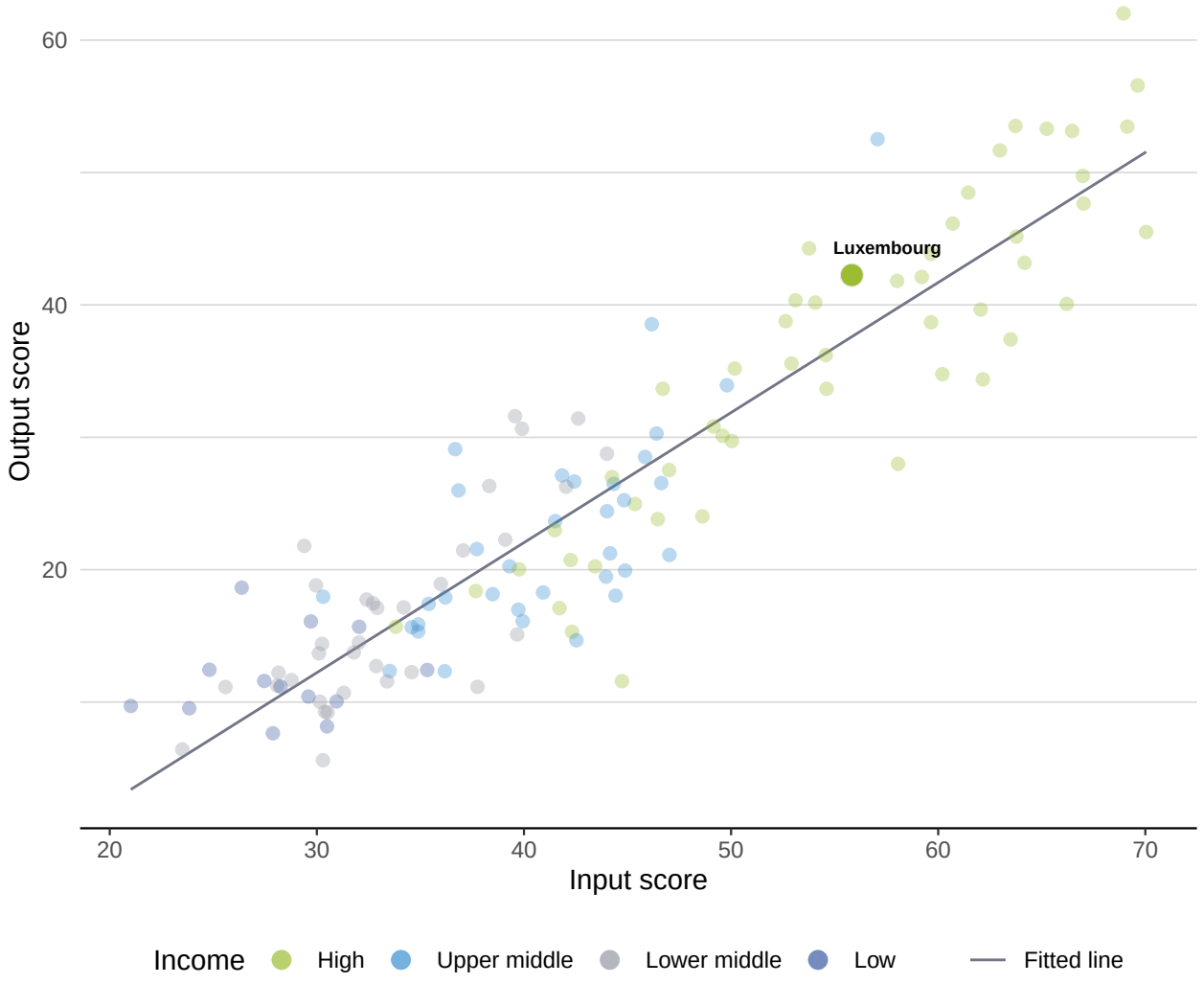


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

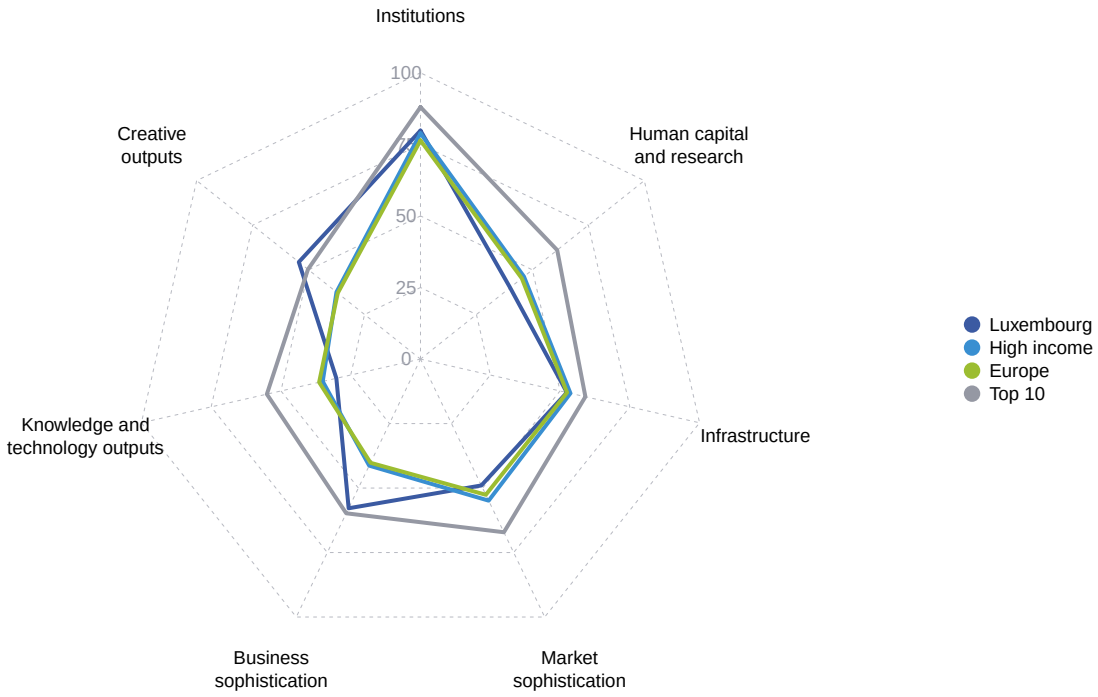
Luxembourg produces more innovation outputs relative to its level of innovation investments.

Innovation input to output performance



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.

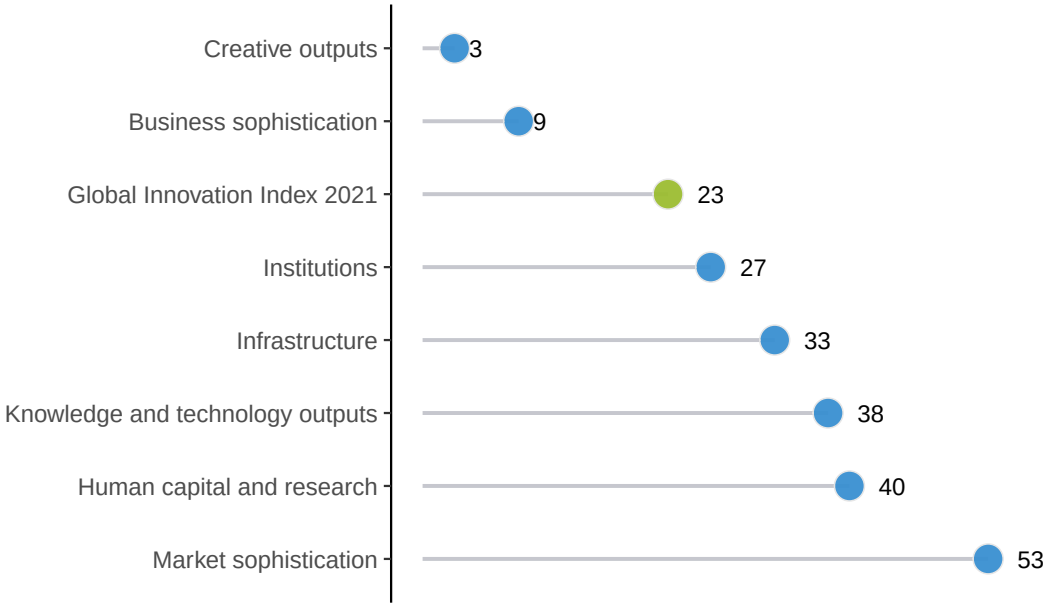
Europe

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

OVERVIEW OF RANKINGS IN THE SEVEN GII 2021 AREAS

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

The seven GII pillar ranks for Luxembourg



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

INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of the strengths and weaknesses of Luxembourg in the GII 2021.

Strengths and weaknesses for Luxembourg

Strengths			Weaknesses		
Code	**Indicator name**	**Rank**	**Code**	**Indicator name**	**Rank**
1.1.1	Political and operational stability	4	1.2.3	Cost of redudancy dismissal	93
2.2.3	Tertiary inbound mobility, %	1	2.1.1	Expenditure on education, % GDP	83
3.1.1	ICT access	1	2.2.1	Tertiary enrolment, % gross	100
3.3.2	Environmental performance	2	2.3.4	QS university ranking, top 3	74
4.2.3	Venture capital investors, deals/bn PPP$ GDP	1	3.2.3	Gross capital formation, % GDP	105
5.1.1	Knowledge-intensive employment, %	1	4.1	Credit	107
5.3.1	Intellectual property payments, % total trade	1	4.1.1	Ease of getting credit	127
5.3.3	ICT services imports, % total trade	1	5.3.2	High-tech imports, % total trade	131
7.2.1	Cultural and creative services exports, % total trade	1	5.3.4	FDI net inflows, % GDP	132
7.2.2	National feature films/mn pop. 15–69	1	6.2.1	Labor productivity growth, %	97
7.3	Online creativity	2	7.2.5	Creative goods exports, % total trade	102
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	4			

Luxembourg

GII 2021 rank **23**

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$	GII 2020 rank
18	26	High	EUR	0.6	70.7	112,875	18

		Score/ Value	Rank	
Institutions		**79.8**	**27**	
1.1	**Political environment**	**90.4**	**6**	
1.1.1	Political and operational stability*	92.9	4	● ◆
1.1.2	Government effectiveness*	89.2	9	
1.2	**Regulatory environment**	**81.9**	**26**	
1.2.1	Regulatory quality*	87.9	11	
1.2.2	Rule of law*	94.0	10	
1.2.3	Cost of redundancy dismissal	21.7	93	○ ◇
1.3	**Business environment**	**67.2**	**77**	◇
1.3.1	Ease of starting a business*	88.8	61	
1.3.2	Ease of resolving insolvency*	45.5	84	◇
Human capital and research		**40.0**	**40**	◇
2.1	**Education**	**48.3**	**70**	◇
2.1.1	Expenditure on education, % GDP	3.6	83	○ ◇
2.1.2	Government funding/pupil, secondary, % GDP/cap	19.4	51	
2.1.3	School life expectancy, years	14.3	65	◇
2.1.4	PISA scales in reading, maths and science	476.7	35	◇
2.1.5	Pupil-teacher ratio, secondary ◴	8.9	19	◆
2.2	**Tertiary education**	**35.8**	**55**	
2.2.1	Tertiary enrolment, % gross	18.6	100	○ ◇
2.2.2	Graduates in science and engineering, %	18.8	80	
2.2.3	Tertiary inbound mobility, %	47.7	1	● ◆
2.3	**Research and development (R&D)**	**36.0**	**31**	◇
2.3.1	Researchers, FTE/mn pop.	5,128.9	16	
2.3.2	Gross expenditure on R&D, % GDP	1.2	33	◇
2.3.3	Global corporate R&D investors, top 3, mn US$	59.2	23	
2.3.4	QS university ranking, top 3*	0.0	74	○ ◇
Infrastructure		**52.5**	**33**	◇
3.1	**Information and communication technologies (ICTs)**	**82.1**	**26**	
3.1.1	ICT access*	95.1	1	● ◆
3.1.2	ICT use*	86.4	8	
3.1.3	Government's online service*	76.5	49	◇
3.1.4	E-participation*	70.2	70	◇
3.2	**General infrastructure**	**28.6**	**66**	◇
3.2.1	Electricity output, GWh/mn pop.	1,719.4	87	◇
3.2.2	Logistics performance*	73.5	24	
3.2.3	Gross capital formation, % GDP	16.8	105	○ ◇
3.3	**Ecological sustainability**	**46.7**	**22**	
3.3.1	GDP/unit of energy use	16.8	15	
3.3.2	Environmental performance*	82.3	2	●
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	1.6	54	
Market sophistication		**49.0**	**53**	◇
4.1	**Credit**	**29.6**	**107**	○ ◇
4.1.1	Ease of getting credit*	15.0	127	○ ◇
4.1.2	Domestic credit to private sector, % GDP	107.3	22	
4.1.3	Microfinance gross loans, % GDP	n/a	n/a	
4.2	**Investment**	**49.0**	**20**	
4.2.1	Ease of protecting minority investors*	54.0	88	◇
4.2.2	Market capitalization, % GDP	79.6	20	
4.2.3	Venture capital investors, deals/bn PPP$ GDP	1.2	1	● ◆
4.2.4	Venture capital recipients, deals/bn PPP$ GDP	0.0	35	
4.3	**Trade, diversification, and market scale**	**68.3**	**69**	◇
4.3.1	Applied tariff rate, weighted avg., %	1.8	25	
4.3.2	Domestic industry diversification	84.2	68	
4.3.3	Domestic market scale, bn PPP$	70.7	93	◇

		Score/ Value	Rank	
Business sophistication		**57.8**	**9**	
5.1	**Knowledge workers**	**65.4**	**9**	
5.1.1	Knowledge-intensive employment, %	60.7	1	● ◆
5.1.2	Firms offering formal training, %	66.1	5	
5.1.3	GERD performed by business, % GDP	0.6	35	◇
5.1.4	GERD financed by business, % ◴	49.6	27	
5.1.5	Females employed w/advanced degrees, %	24.3	16	
5.2	**Innovation linkages**	**59.2**	**6**	
5.2.1	University-industry R&D collaboration†	65.8	13	
5.2.2	State of cluster development and depth†	67.2	11	
5.2.3	GERD financed by abroad, % GDP ◴	0.1	47	
5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP	0.2	8	
5.2.5	Patent families/bn PPP$ GDP	5.4	7	◆
5.3	**Knowledge absorption**	**49.0**	**14**	
5.3.1	Intellectual property payments, % total trade	4.5	1	● ◆
5.3.2	High-tech imports, % total trade	1.6	131	○ ◇
5.3.3	ICT services imports, % total trade	4.4	1	● ◆
5.3.4	FDI net inflows, % GDP	–16.8	132	○ ◇
5.3.5	Research talent, % in businesses	37.7	36	◇
Knowledge and technology outputs		**30.1**	**38**	◇
6.1	**Knowledge creation**	**39.1**	**24**	
6.1.1	Patents by origin/bn PPP$ GDP	7.3	14	
6.1.2	PCT patents by origin/bn PPP$ GDP	4.5	8	
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	n/a	
6.1.4	Scientific and technical articles/bn PPP$ GDP	18.7	48	◇
6.1.5	Citable documents H-index	11.6	66	◇
6.2	**Knowledge impact**	**27.0**	**76**	◇
6.2.1	Labor productivity growth, %	–1.7	97	○
6.2.2	New businesses/th pop. 15–64	17.2	7	◆
6.2.3	Software spending, % GDP	0.2	73	◇
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	3.3	71	
6.2.5	High-tech manufacturing, %	16.4	69	◇
6.3	**Knowledge diffusion**	**24.3**	**49**	◇
6.3.1	Intellectual property receipts, % total trade	2.1	11	
6.3.2	Production and export complexity	n/a	n/a	
6.3.3	High-tech exports, % total trade	0.6	86	◇
6.3.4	ICT services exports, % total trade	3.0	35	
Creative outputs		**54.4**	**3**	● ◆
7.1	**Intangible assets**	**52.2**	**15**	
7.1.1	Trademarks by origin/bn PPP$ GDP	69.2	24	
7.1.2	Global brand value, top 5,000, % GDP	112.3	17	
7.1.3	Industrial designs by origin/bn PPP$ GDP	6.9	19	
7.1.4	ICTs and organizational model creation†	72.2	15	
7.2	**Creative goods and services**	**42.8**	**8**	
7.2.1	Cultural and creative services exports, % total trade	6.6	1	● ◆
7.2.2	National feature films/mn pop. 15–69	29.6	1	● ◆
7.2.3	Entertainment and media market/th pop. 15–69	n/a	n/a	
7.2.4	Printing and other media, % manufacturing	0.7	73	
7.2.5	Creative goods exports, % total trade	0.1	102	○
7.3	**Online creativity**	**70.1**	**2**	● ◆
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	84.3	4	● ◆
7.3.2	Country-code TLDs/th pop. 15–69	68.7	9	
7.3.3	Wikipedia edits/mn pop. 15–69	78.8	13	
7.3.4	Mobile app creation/bn PPP$ GDP	44.8	11	

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 IV 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 either missing or outdated for Luxembourg.

Missing data for Luxembourg

Code	Indicator name	Economy year	Model year	Source
4.1.3	Microfinance gross loans, % GDP	n/a	2018	Microfinance Information Exchange
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	2019	World Intellectual Property Organization
6.3.2	Production and export complexity	n/a	2018	Growth Lab, Harvard University
7.2.3	Entertainment and media market/th pop. 15–69	n/a	2020	PwC

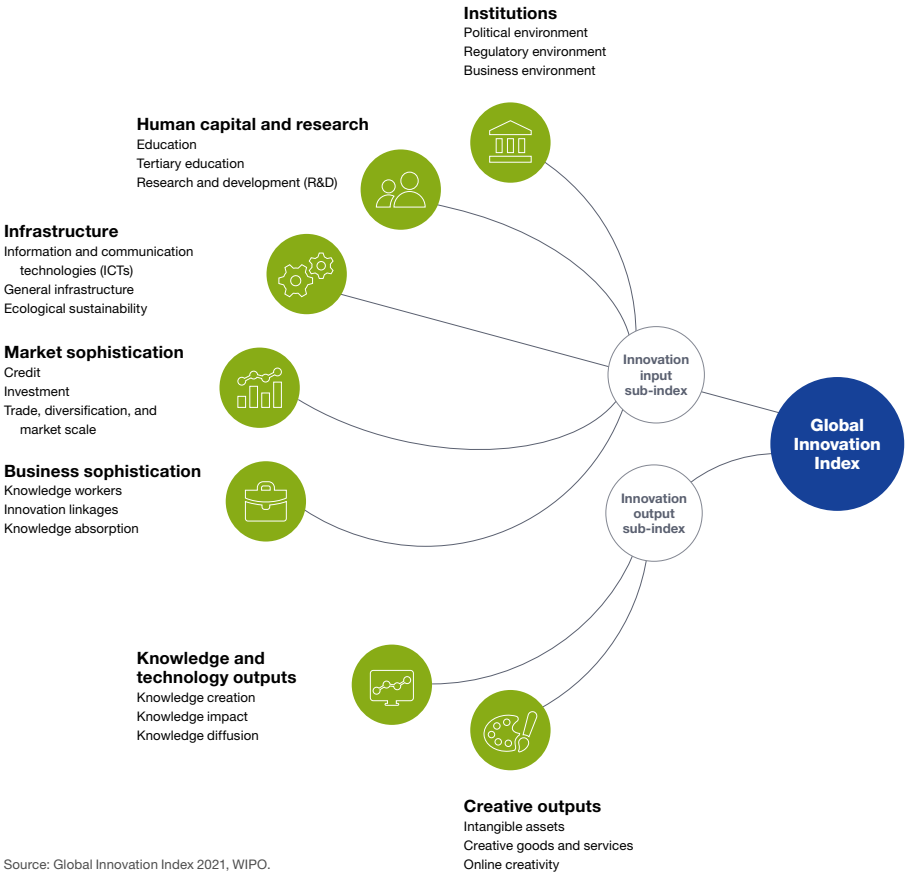
Outdated data for Luxembourg

Code	Indicator name	Economy year	Model year	Source
2.1.5	Pupil-teacher ratio, secondary	2018	2019	UNESCO Institute for Statistics
5.1.4	GERD financed by business, %	2017	2018	UNESCO Institute for Statistics; Eurostat; OECD - Main Science and Technology Indicators
5.2.3	GERD financed by abroad, % GDP	2017	2018	UNESCO Institute for Statistics

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.



Source: Global Innovation Index 2021, WIPO.

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.