GLOBAL INNOVATION INDEX 2020

LUXEMBOURG

18th Luxembourg ranks 18th among the 131 economies featured in the GII 2020.

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 2020 is between ranks 17 and 19.

Rankings of Luxembourg (2018–2020)

	GII	Innovation inputs	Innovation outputs
2020	18	24	14
2019	18	23	11
2018	15	25	4

- Luxembourg performs better in innovation outputs than innovation inputs in 2020.
- This year Luxembourg ranks 24th in innovation inputs, lower than last year and higher compared to 2018.
- As for innovation outputs, Luxembourg ranks 14th. This position is lower than last year and lower compared to 2018.

17th Luxembourg ranks 17th among the 49 high-income group economies.

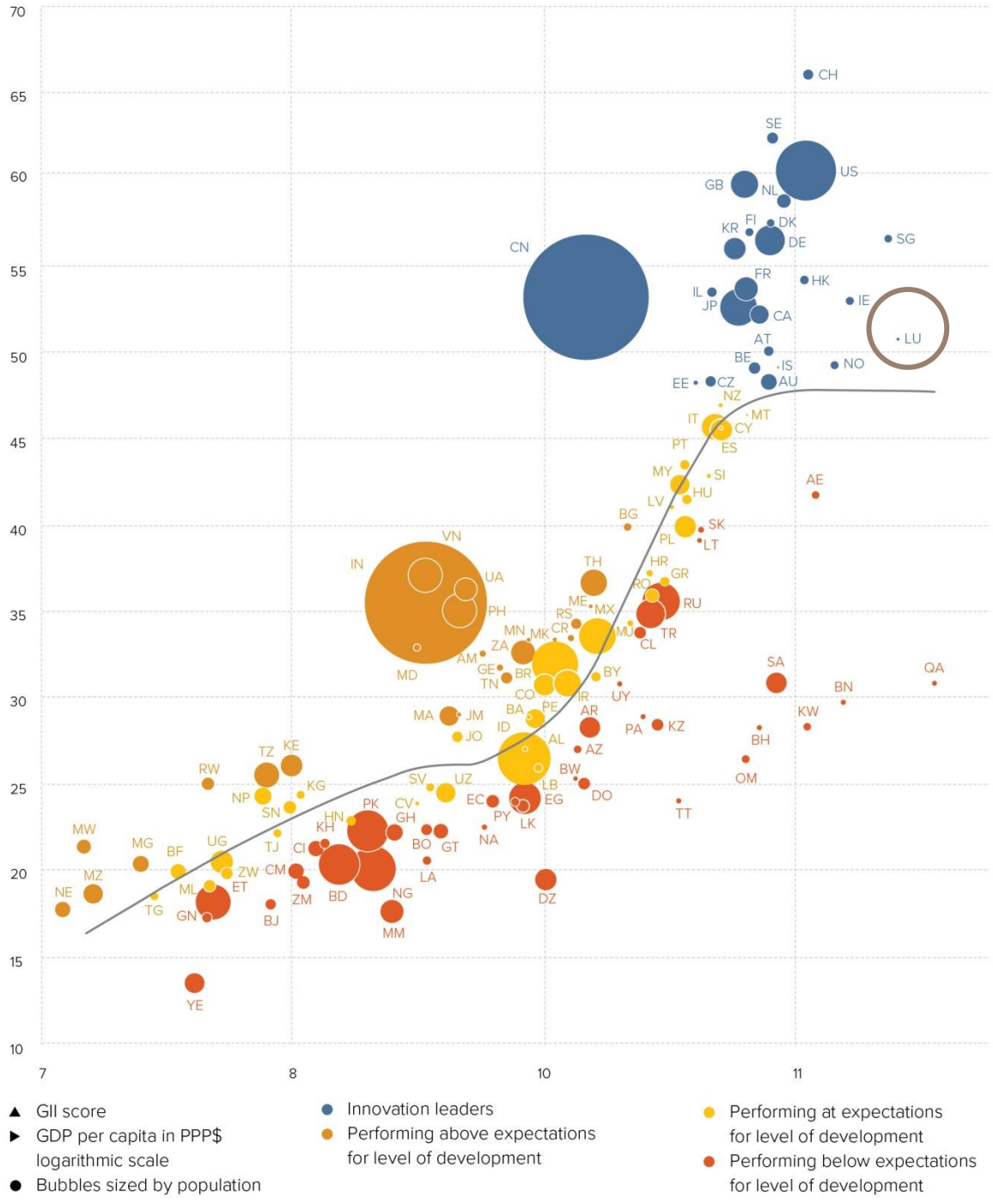
10th Luxembourg ranks 10th among the 39 economies in Europe.

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 performing below expectations.

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

The positive relationship between innovation and development

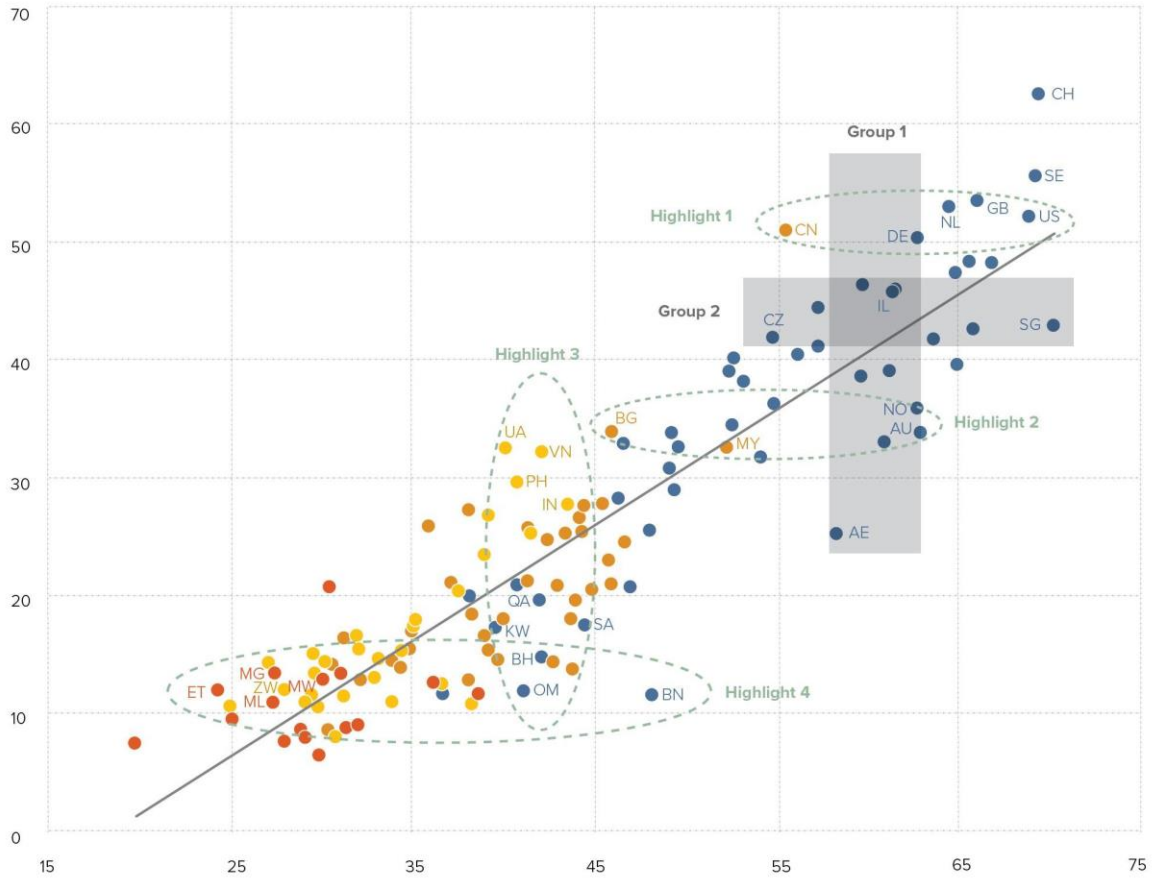


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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, 2020



▲ Output score
► Input score

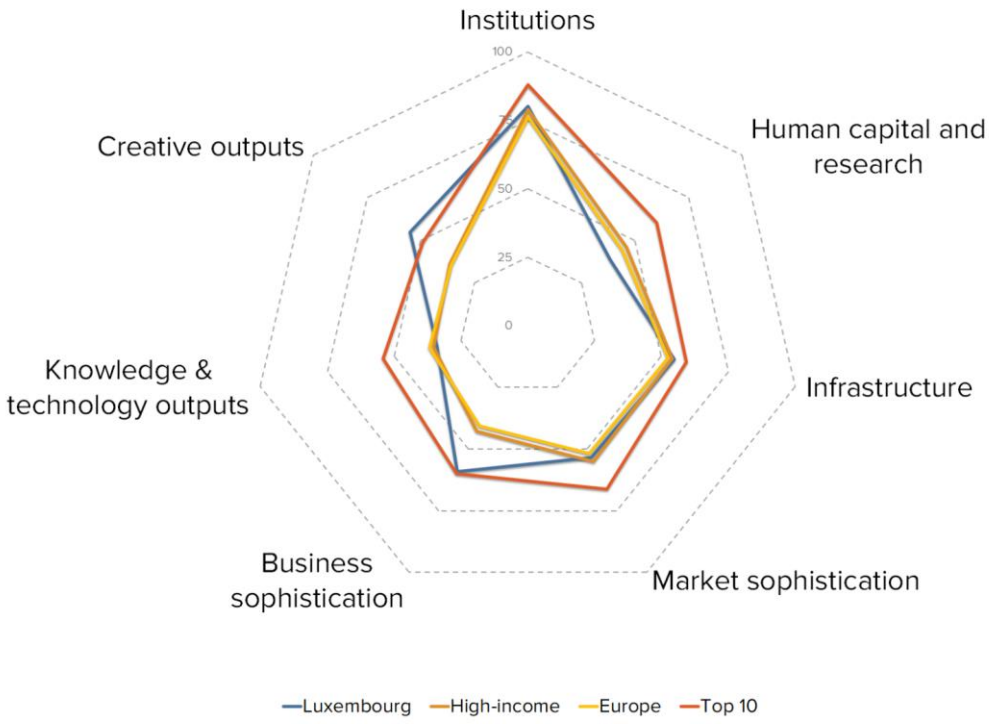
● High income group
● Upper middle-income group
● Lower middle-income group
● Low income group

— Fitted values

AU	Australia	IN	India	NL	Netherlands	CH	Switzerland
BH	Bahrain	IL	Israel	NO	Norway	UA	Ukraine
BN	Brunei Darussalam	KW	Kuwait	OM	Oman	AE	United Arab Emirates
BG	Bulgaria	MG	Madagascar	PH	Philippines	GB	United Kingdom
CN	China	MW	Malawi	QA	Qatar	US	United States of America
CZ	Czech Republic	ML	Mali	SA	Saudi Arabia	VN	Viet Nam
ET	Ethiopia	MY	Malaysia	SG	Singapore	ZW	Zimbabwe
DE	Germany			SE	Sweden		

BENCHMARKING LUXEMBOURG AGAINST OTHER HIGH-INCOME GROUP ECONOMIES AND EUROPE

Luxembourg's scores in the seven GII pillars



High-income group economies

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

Conversely, Luxembourg scores below average for its income group in three GII pillars: Human capital & research, Market sophistication and Knowledge & technology outputs.

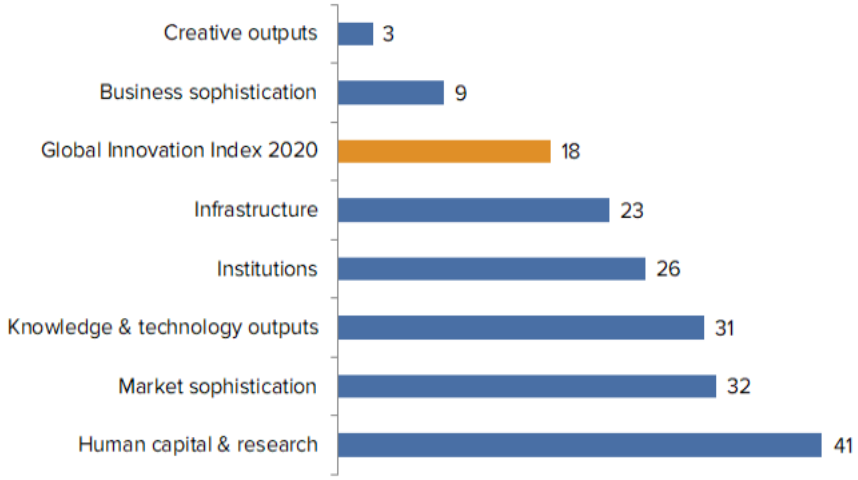
Europe

Compared to other economies in Europe, Luxembourg performs:

- above average in five out of the seven GII pillars: Institutions, Infrastructure, Market sophistication, Business sophistication and Creative outputs; and
- below average in two out of the seven GII pillars: Human capital & research and Knowledge & technology outputs.

OVERVIEW OF LUXEMBOURG RANKINGS IN THE SEVEN GII AREAS

Luxembourg performs best in Creative outputs and its weakest performance is in Human capital & research.



*The highest possible ranking in each pillar is 1.

INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of the strengths and weaknesses of Luxembourg in the GII 2020.

Strengths

Code	Indicator name	Rank
1.1.1	Political and operational stability*	3
2.2.3	Tertiary inbound mobility, %	1
3.1.1	ICT access*	1
3.3.2	Environmental performance*	2
4.2.3	Venture capital deals/bn PPP$ GDP	1
5.1.1	Knowledge-intensive employment, %	1
5.2.5	Patent families 2+ offices/bn PPP$ GDP	1
5.3.1	Intellectual property payments, % total trade	1
7	Creative outputs	3
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
1.2.3	Cost of redundancy dismissal, salary weeks	92
2.2.1	Tertiary enrolment, % gross	95
2.2.2	Graduates in science & engineering, %	80
2.3.4	QS university ranking, average score top 3*	77
3.2.1	Electricity output, GWh/mn pop	88
3.2.3	Gross capital formation, % GDP	111
4.1	Credit	102
4.1.1	Ease of getting credit*	127
5.3.2	High-tech imports, % total trade	130
6.2.1	Growth rate of PPP$ GDP/worker, %	108
7.2.5	Creative goods exports, % total trade	100

STRENGTHS

GII strengths for Luxembourg are found in six of the seven GII pillars.

- Institutions (26): exhibits strengths in the indicator Political and operational stability (3).
- Human capital & research (41): shows strengths in the indicator Tertiary inbound mobility (1).
- Infrastructure (23): demonstrates strengths in the indicators ICT access (1) and Environmental performance (2).
- Market sophistication (32): reveals strengths in the indicator Venture capital deals (1).
- Business sophistication (9): displays strengths in the indicators Knowledge-intensive employment (1), Patent families 2+ offices (1) and Intellectual property payments (1).
- Creative outputs (3): shows strengths in the sub-pillar Online creativity (1) and in the indicators Cultural & creative services exports (1), National feature films (1) and Generic top-level domains (4).

WEAKNESSES

GII weaknesses for Luxembourg are found in all GII pillars.

- Institutions (26): exhibits weaknesses in the indicator Cost of redundancy dismissal (92).
- Human capital & research (41): reveals weaknesses in the indicators Tertiary enrolment (95), Graduates in science & engineering (80) and QS university ranking (77).
- Infrastructure (23): displays weaknesses in the indicators Electricity output (88) and Gross capital formation (111).
- Market sophistication (32): shows weaknesses in the sub-pillar Credit (102) and in the indicator Ease of getting credit (127).
- Business sophistication (9): demonstrates weaknesses in the indicator High-tech imports (130).
- Knowledge & technology outputs (31): exhibits weaknesses in the indicator Growth rate of PPP$ GDP/worker (108).
- Creative outputs (3): reveals weaknesses in the indicator Creative goods exports (100).

LUXEMBOURG

GII 2020 rank

18

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$	GDP per capita, PPP$	GII 2019 rank
14	24	High	EUR	0.6	66.8	95,117.1	18

		Score/Value	Rank	
INSTITUTIONS		**80.2**	**26**	
1.1	**Political environment**	**91.5**	**6**	
1.1.1	Political and operational stability*	94.6	3	● ◆
1.1.2	Government effectiveness*	89.9	9	
1.2	**Regulatory environment**	**82.0**	**24**	
1.2.1	Regulatory quality*	88.2	11	
1.2.2	Rule of law*	93.9	10	
1.2.3	Cost of redundancy dismissal, salary weeks	21.7	92	○ ◇
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 & RESEARCH		**38.6**	**41**	◇
2.1	**Education**	**45.6**	**66**	◇
2.1.1	Expenditure on education, % GDP ⊙	4.0	75	
2.1.2	Government funding/pupil, secondary, % GDP/cap ⊙	19.4	51	
2.1.3	School life expectancy, years	14.3	68	◇
2.1.4	PISA scales in reading, maths, & science	476.7	35	◇
2.1.5	Pupil-teacher ratio, secondary ⊙	8.8	20	◆
2.2	**Tertiary education**	**34.5**	**61**	
2.2.1	Tertiary enrolment, % gross	19.2	95	○ ◇
2.2.2	Graduates in science & engineering, % ⊙	17.9	80	○ ◇
2.2.3	Tertiary inbound mobility, %	46.7	1	● ◆
2.3	**Research & development (R&D)**	**35.6**	**31**	◇
2.3.1	Researchers, FTE/mn pop	4,941.7	17	
2.3.2	Gross expenditure on R&D, % GDP	1.2	32	◇
2.3.3	Global R&D companies, avg. exp. top 3, mn $US	58.5	24	
2.3.4	QS university ranking, average score top 3*	0.0	77	○ ◇
INFRASTRUCTURE		**54.9**	**23**	
3.1	**Information & communication technologies (ICTs)**	**90.8**	**5**	
3.1.1	ICT access*	92.8	1	● ◆
3.1.2	ICT use*	84.3	10	
3.1.3	Government's online service*	92.4	22	
3.1.4	E-participation*	93.8	19	
3.2	**General infrastructure**	**27.1**	**64**	◇
3.2.1	Electricity output, kWh/mn pop	1,536.6	88	○ ◇
3.2.2	Logistics performance*	73.2	24	
3.2.3	Gross capital formation, % GDP	18.2	111	○ ◇
3.3	**Ecological sustainability**	**46.9**	**24**	
3.3.1	GDP/unit of energy use	13.5	19	
3.3.2	Environmental performance*	82.3	2	●
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	2.0	45	
MARKET SOPHISTICATION		**53.4**	**32**	
4.1	**Credit**	**31.9**	**102**	○ ◇
4.1.1	Ease of getting credit*	15.0	127	○ ◇
4.1.2	Domestic credit to private sector, % GDP	109.8	20	
4.1.3	Microfinance gross loans, % GDP	n/a	n/a	
4.2	**Investment**	**65.3**	**11**	
4.2.1	Ease of protecting minority investors*	54.0	88	◇
4.2.2	Market capitalization, % GDP	92.5	14	
4.2.3	Venture capital deals/bn PPP$ GDP	1.3	1	● ◆
4.3	**Trade, competition, and market scale**	**63.0**	**66**	◇
4.3.1	Applied tariff rate, weighted avg., %	1.7	22	
4.3.2	Intensity of local competition+	72.4	43	
4.3.3	Domestic market scale, bn PPP$	66.8	94	◇

		Score/Value	Rank	
BUSINESS SOPHISTICATION		**59.0**	**9**	
5.1	**Knowledge workers**	**59.7**	**15**	
5.1.1	Knowledge-intensive employment, %	57.7	1	● ◆
5.1.2	Firms offering formal training, %	n/a	n/a	
5.1.3	GERD performed by business, % GDP	0.7	33	◇
5.1.4	GERD financed by business, %	49.6	27	
5.1.5	Females employed w/advanced degrees, %	22.7	18	
5.2	**Innovation linkages**	**63.3**	**6**	
5.2.1	University/industry research collaboration+	69.4	9	
5.2.2	State of cluster development+	68.8	10	
5.2.3	GERD financed by abroad, % GDP	0.1	45	◇
5.2.4	JV-strategic alliance deals/bn PPP$ GDP	0.2	8	
5.2.5	Patent families 2+ offices/bn PPP$ GDP	7.0	1	● ◆
5.3	**Knowledge absorption**	**54.0**	**9**	
5.3.1	Intellectual property payments, % total trade	4.4	1	● ◆
5.3.2	High-tech imports, % total trade	1.6	130	○ ◇
5.3.3	ICT services imports, % total trade	3.4	5	◆
5.3.4	FDI net inflows, % GDP	11.3	8	
5.3.5	Research talent, % in business enterprise	43.9	30	
KNOWLEDGE & TECHNOLOGY OUTPUTS		**33.9**	**31**	◇
6.1	**Knowledge creation**	**43.7**	**19**	
6.1.1	Patents by origin/bn PPP$ GDP	9.4	11	
6.1.2	PCT patents by origin/bn PPP$ GDP	5.3	7	
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	n/a	
6.1.4	Scientific & technical articles/bn PPP$ GDP	13.5	40	◇
6.1.5	Citable documents H-index	10.9	70	◇
6.2	**Knowledge impact**	**21.1**	**79**	◇
6.2.1	Growth rate of PPP$ GDP/worker, %	-1.1	108	○ ◇
6.2.2	New businesses/th pop. 15-64	17.2	7	◆
6.2.3	Computer software spending, % GDP	0.0	69	◇
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	4.0	63	
6.2.5	High- and medium-high-tech manufacturing, %	14.2	67	◇
6.3	**Knowledge diffusion**	**37.0**	**29**	
6.3.1	Intellectual property receipts, % total trade	1.9	12	
6.3.2	High-tech net exports, % total trade	0.7	74	◇
6.3.3	ICT services exports, % total trade	3.1	28	
6.3.4	FDI net outflows, % GDP	11.3	5	◆
CREATIVE OUTPUTS		**55.0**	**3**	● ◆
7.1	**Intangible assets**	**51.5**	**11**	
7.1.1	Trademarks by origin/bn PPP$ GDP	89.8	19	
7.1.2	Global brand value, top 5,000, % GDP	129.9	15	
7.1.3	Industrial designs by origin/bn PPP$ GDP	8.4	15	
7.1.4	ICTs & organizational model creation+	72.2	15	
7.2	**Creative goods and services**	**43.2**	**8**	
7.2.1	Cultural & creative services exports, % total trade	4.5	1	● ◆
7.2.2	National feature films/mn pop. 15-69	29.6	1	● ◆
7.2.3	Entertainment & Media market/th pop. 15-69	n/a	n/a	
7.2.4	Printing and other media, % manufacturing	0.8	69	
7.2.5	Creative goods exports, % total trade	0.1	100	○ ◇
7.3	**Online creativity**	**73.6**	**1**	● ◆
7.3.1	Generic top-level domains (TLDs)/th pop. 15-69	86.0	4	● ◆
7.3.2	Country-code TLDs/th pop. 15-69	68.1	9	
7.3.3	Wikipedia edits/mn pop. 15-69	87.8	9	
7.3.4	Mobile app creation/bn PPP$ GDP	53.1	11	

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 either missing or outdated for Luxembourg.

Missing data

Code	Indicator name	Country year	Model year	Source
4.1.3	Microfinance gross loans, % GDP	n/a	2018	Microfinance Information Exchange
5.1.2	Firms offering formal training, %	n/a	2018	World Bank
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	2018	World Intellectual Property Organization
7.2.3	Entertainment & Media market/th pop. 15–69	n/a	2018	PwC

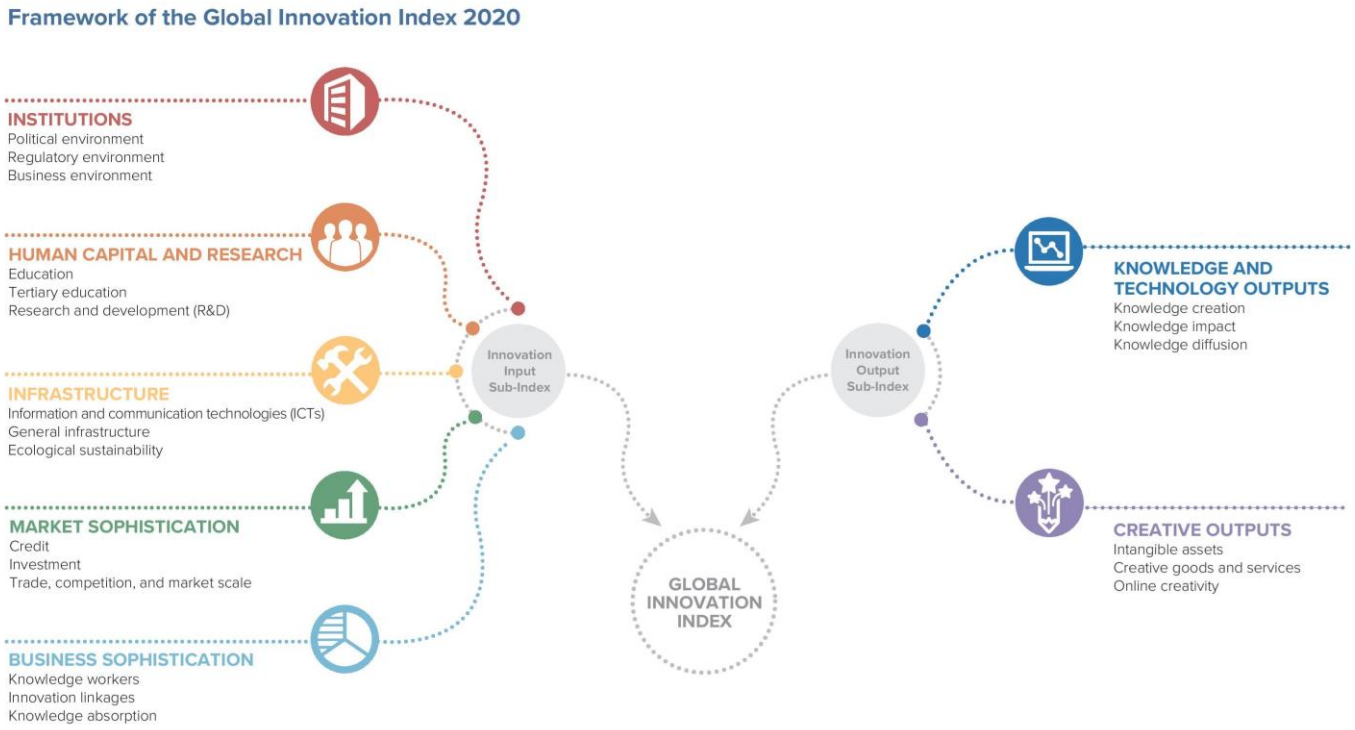
Outdated data

Code	Indicator name	Country year	Model year	Source
2.1.1	Expenditure on education, % GDP	2015	2018	UNESCO Institute for Statistics
2.1.2	Government funding/pupil, secondary, % GDP/cap	2015	2016	UNESCO Institute for Statistics
2.1.5	Pupil-teacher ratio, secondary	2016	2018	UNESCO Institute for Statistics
2.2.2	Graduates in science & engineering, %	2016	2017	UNESCO Institute for Statistics

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 2020, the GII presents its 13th edition devoted to the theme *Who Will Finance Innovation?*

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.