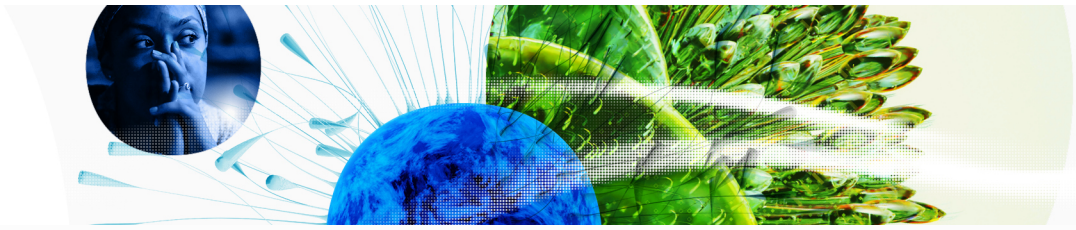
Global Innovation Index 2023



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**.

Estonia ranking in the Global Innovation Index 2023

> Estonia ranks 16th among the 132 economies featured in the GII 2023.

> Estonia ranks 15th among the 50 high-income group economies.

> Estonia ranks 9th among the 39 economies in Europe.

> Estonia GII Ranking (2020-2023)

The table shows the rankings of Estonia over the past four years. 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 Estonia in the GII 2023 is between ranks 15 and 18.

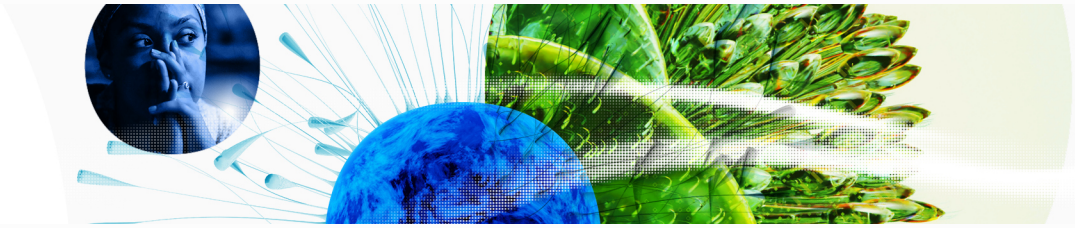
	GII Position	Innovation Inputs	Innovation Outputs
2020	25th	25th	20th
2021	21st	24th	20th
2022	18th	15th	22nd
2023	16th	14th	16th

Estonia performs worse in innovation outputs than innovation inputs in 2023.

This year Estonia ranks 14th in innovation inputs. This position is higher than last year.

Estonia ranks 16th in innovation outputs. This position is higher than last year.

Global Innovation Index 2023

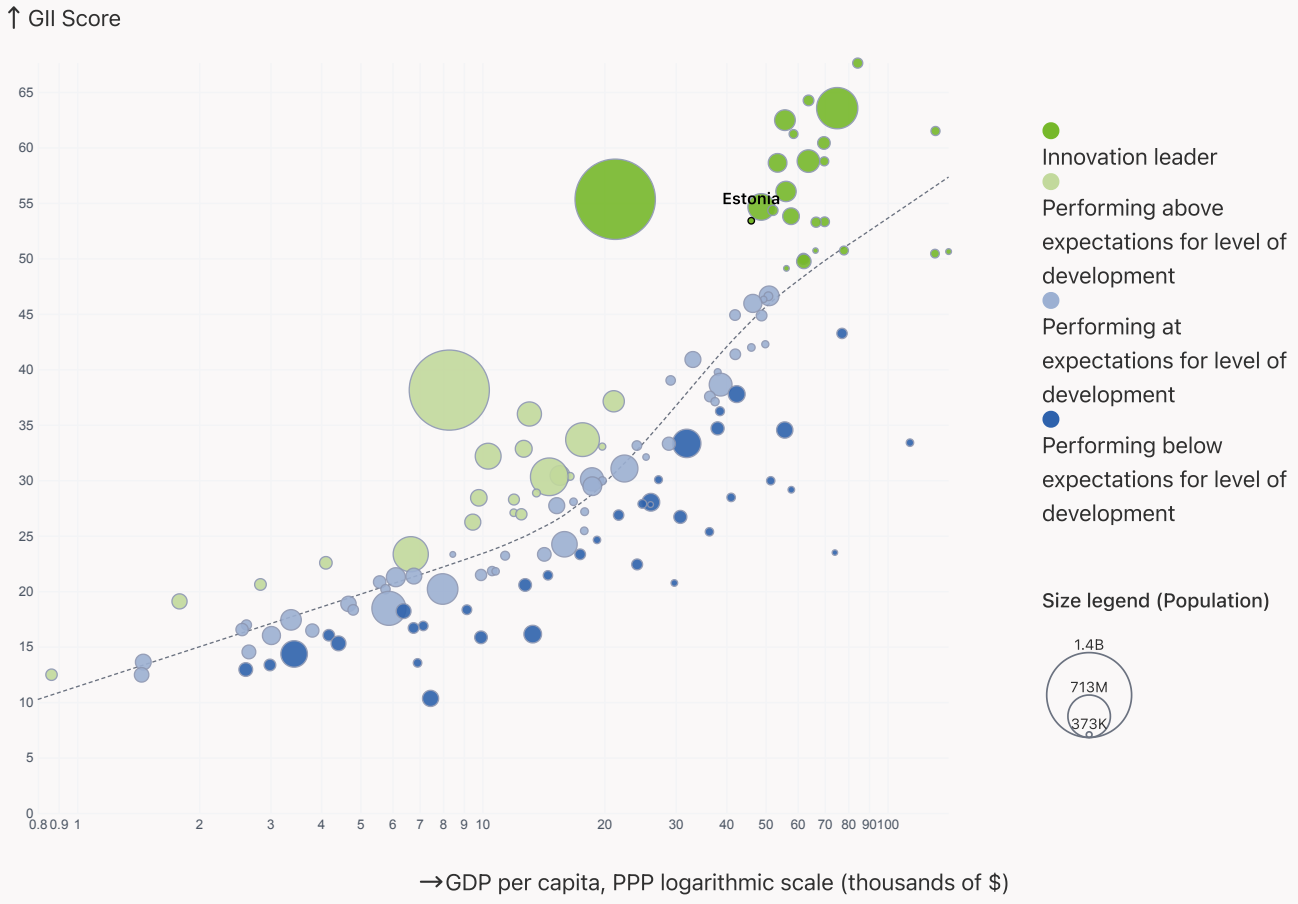


→ Expected vs. observed innovation performance

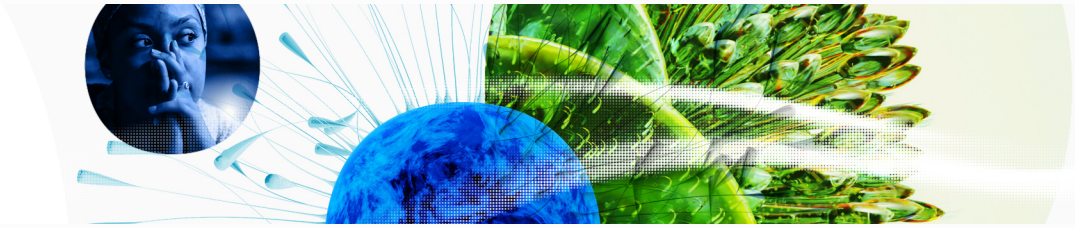
The bubble chart below shows the relationship between income levels (GDP per capita) and innovation performance (GII score). The trend line gives an indication of the expected innovation performance according to income level. Economies appearing above the trend line are performing better than expected and those below are performing below expectations.

> Estonia is an innovation leader, ranking in the top 25 of the GII.

> Innovation overperformers relative to their economic development



Global Innovation Index 2023

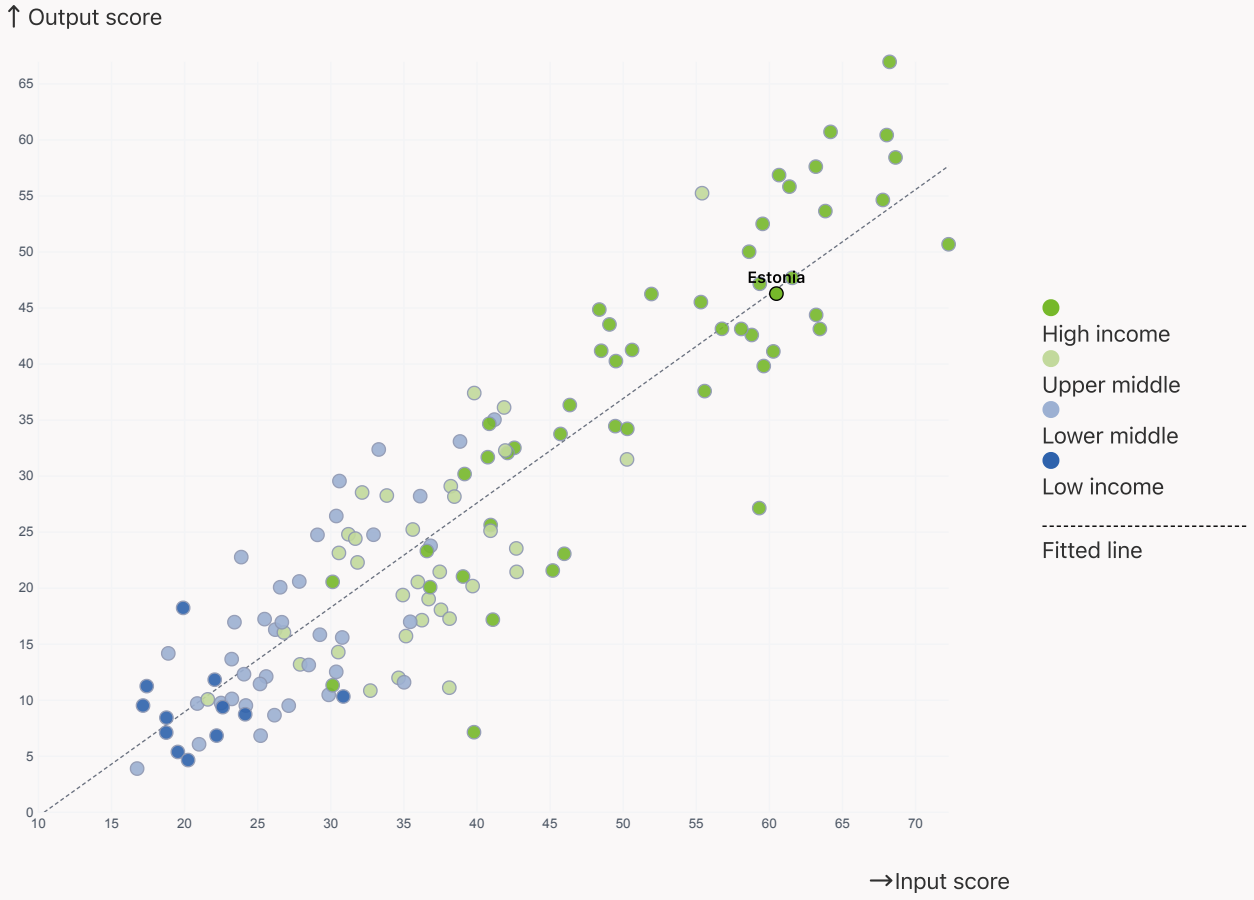


→ Effectively translating innovation investments into innovation outputs

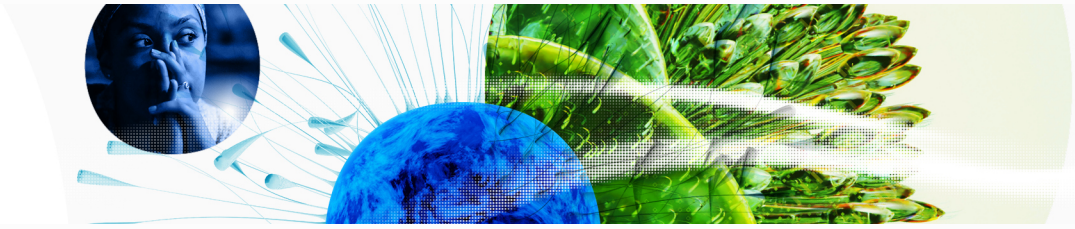
The chart below shows the relationship between innovation inputs and innovation outputs. Economies above the line are effectively translating costly innovation investments into more and higher-quality outputs.

> Estonia produces less innovation outputs relative to its level of innovation investments.

> Relationship between innovation inputs and outputs

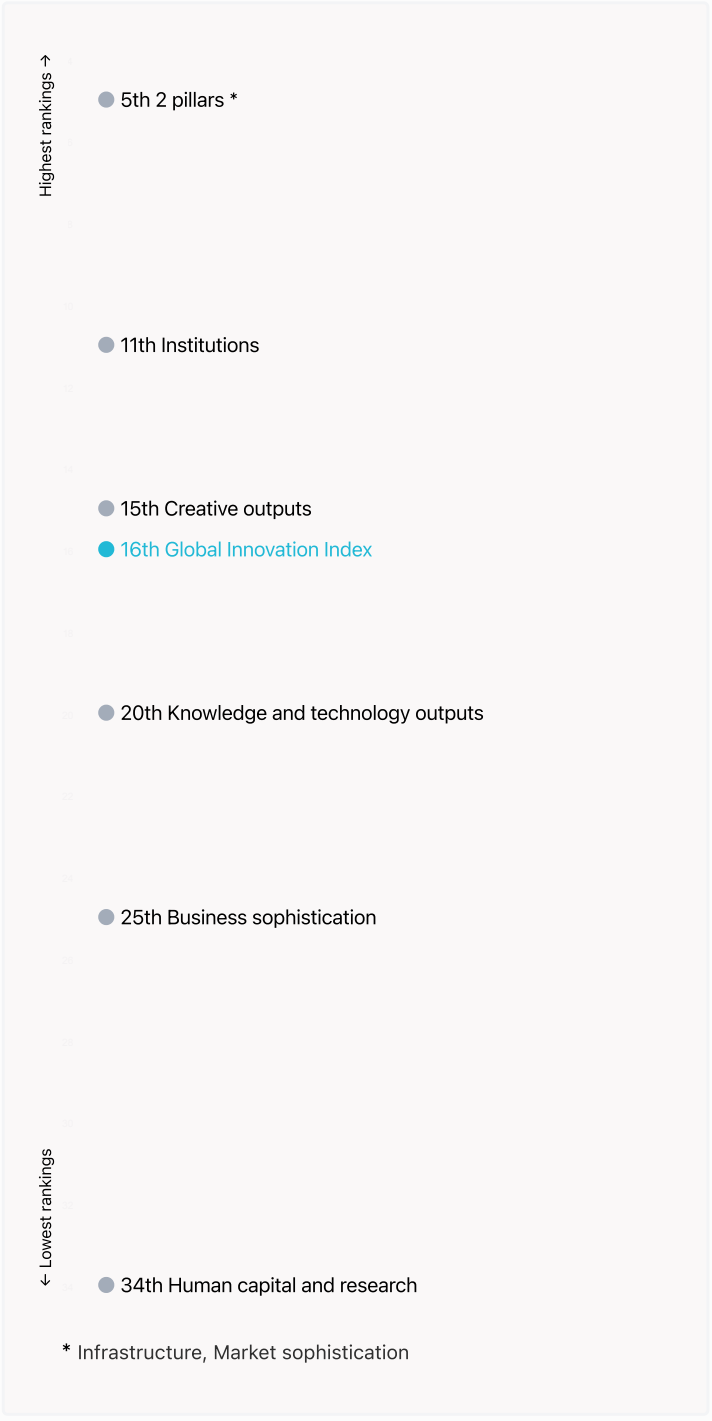


Global Innovation Index 2023



→ Overview of Estonia's rankings in the seven areas of the GII in 2023

The chart shows the ranking for each of the seven areas that the GII comprises. The strongest areas for Estonia are those that rank above the GII (shown in blue) and the weakest are those that rank below.



> Highest rankings

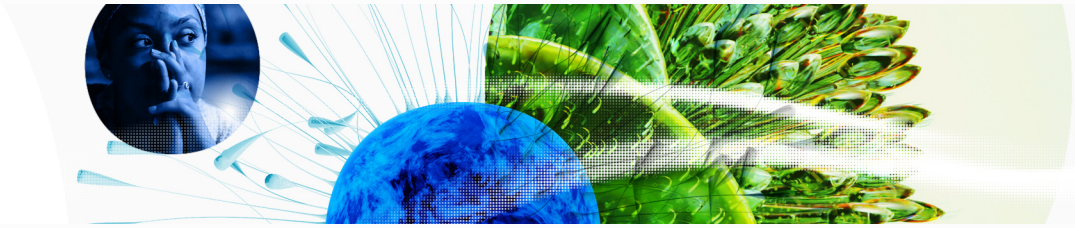
Estonia ranks highest in Infrastructure, Market sophistication (5th), Institutions (11th) and Creative outputs (15th).

> Lowest rankings

Estonia ranks lowest in Human capital and research (34th), Business sophistication (25th) and Knowledge and technology outputs (20th).

The full WIPO Intellectual Property Statistics profile for Estonia can be found on this link.

Global Innovation Index 2023



→ Benchmark of Estonia against other country groupings for each of the seven areas of the GII Index

The charts shows the relative position of Estonia (blue bar) against other country groupings (grey bars), for each of the seven areas of the GII Index.

> High-Income economies

Estonia performs above the high-income group average in Knowledge and technology outputs, Creative outputs, Business sophistication, Market sophistication, Infrastructure, Institutions.

> Europe

Estonia performs above the regional average in Knowledge and technology outputs, Creative outputs, Business sophistication, Market sophistication, Infrastructure, Institutions.

Knowledge and technology outputs

- Top 10 | Score: 58.96
- Estonia | Score: 43.68
- Europe | Score: 38.80
- High income | Score: 38.62

Creative outputs

- Top 10 | 56.09
- Estonia | 48.77
- High income | 40.27
- Europe | 39.87

Business sophistication

- Top 10 | 64.39
- Estonia | 49.19
- High income | 46.38
- Europe | 44.61

Market sophistication

- Estonia | 67.64
- Top 10 | 61.93
- High income | 46.42
- Europe | 43.65

Human capital and research

- Top 10 | 60.28
- High income | 46.30
- Europe | 44.05
- Estonia | 42.89

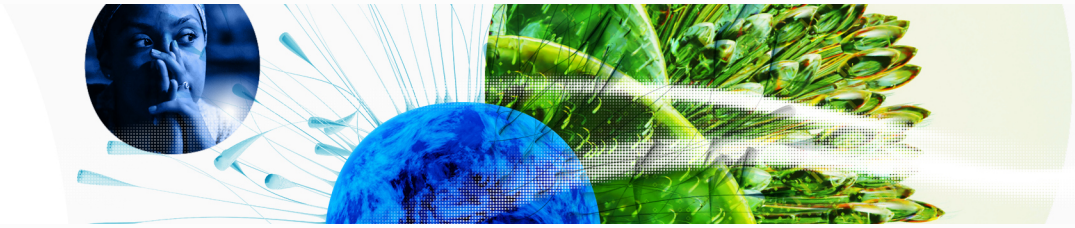
Infrastructure

- Estonia | 64.31
- Top 10 | 62.83
- High income | 55.85
- Europe | 54.69

Institutions

- Top 10 | 79.85
- Estonia | 78.60
- High income | 68.16
- Europe | 61.69

Global Innovation Index 2023



→ Innovation strengths and weaknesses in Estonia

The table below gives an overview of the indicator strengths and weaknesses of Estonia in the GII 2023.

> Estonia's main innovation strengths are **Government's online service** (rank 1), **ICT services imports, % total trade** (rank 1) and **Unicorn valuation, % GDP** (rank 1).

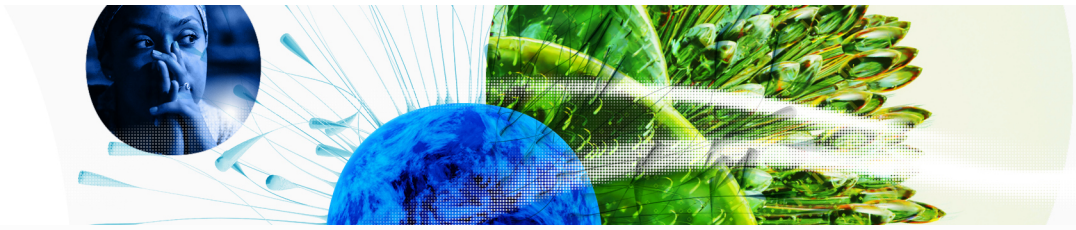
Strengths

Rank	Code	Indicator name
1	3.1.3	Government's online service
1	5.3.3	ICT services imports, % total trade
1	6.2.2	Unicorn valuation, % GDP
1	4.2.4	VC received, value, % GDP
1	4.2.3	VC recipients, deals/bn PPP$ GDP
3	1.3.2	Entrepreneurship policies and culture
3	3.1.4	E-participation
3	7.2.2	National feature films/mn pop. 15-69
4	3.3.3	ISO 14001 environment/bn PPP$ GDP
4	2.1.4	PISA scales in reading, maths and science

Weaknesses

Rank	Code	Indicator name
101	4.3.3	Domestic market scale, bn PPP$
89	6.2.3	Software spending, % GDP
87	5.3.1	Intellectual property payments, % total trade
76	3.3.1	GDP/unit of energy use
74	7.1.3	Global brand value, top 5,000
62	5.2.2	State of cluster development
60	5.3.2	High-tech imports, % total trade
53	7.1.1	Intangible asset intensity, top 15, %
51	2.1.2	Government funding/pupil, secondary, % GDP/cap
40	2.3.3	Global corporate R&D investors, top 3, mn US$

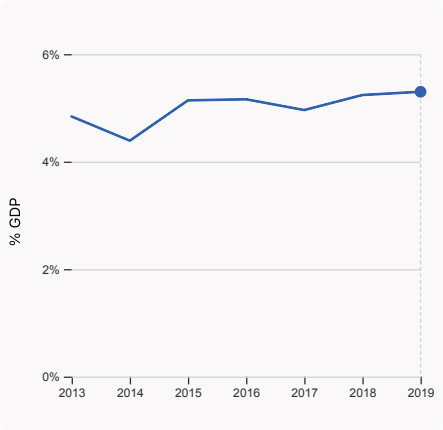
Global Innovation Index 2023



→ Estonia's innovation system

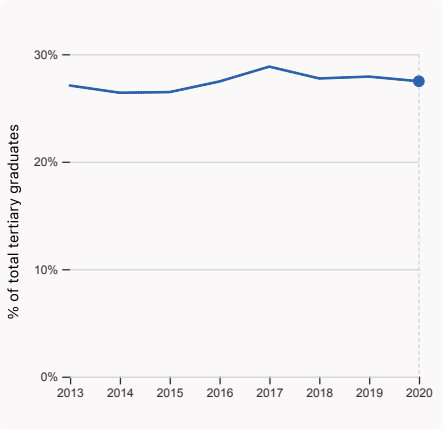
As far as practicable, the plots below present unscaled indicator data.

> Innovation inputs in Estonia



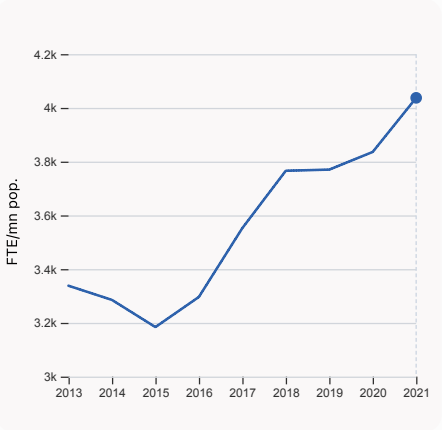
2.1.1 Expenditure on education, % GDP

was equal to 5.3% GDP in 2019, up by 0.06 percentage points from the year prior – and equivalent to an indicator rank of 26.



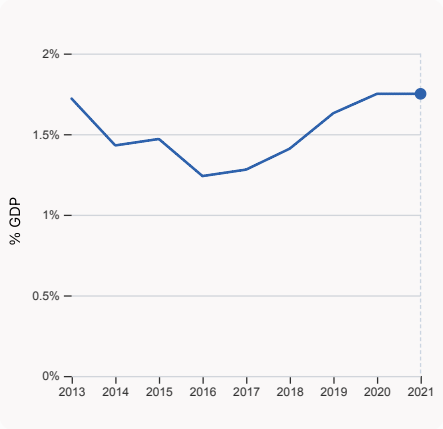
2.2.2 Graduates in science and engineering, %

was equal to 27.48% of total tertiary graduates in 2020, down by 0.43 percentage points from the year prior – and equivalent to an indicator rank of 31.



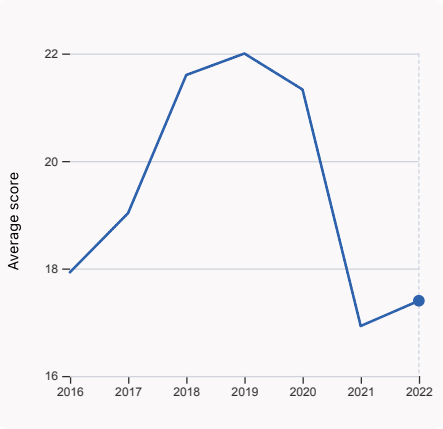
2.3.1 Researchers, FTE/mn pop.

was equal to 4,037.39 FTE/mn pop. in 2021, up by 5.25% from the year prior – and equivalent to an indicator rank of 27.



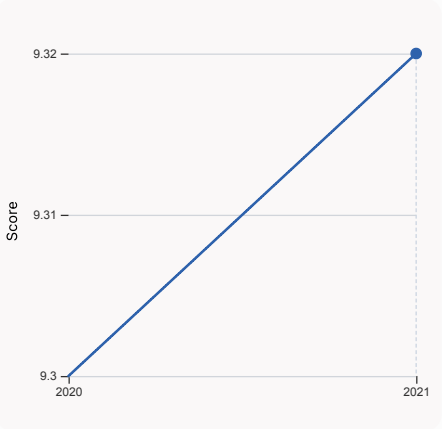
2.3.2 Gross expenditure on R&D, % GDP

was equal to 1.75% GDP in 2021, with no change from the year prior – and equivalent to an indicator rank of 22.



2.3.4 QS university ranking, top 3

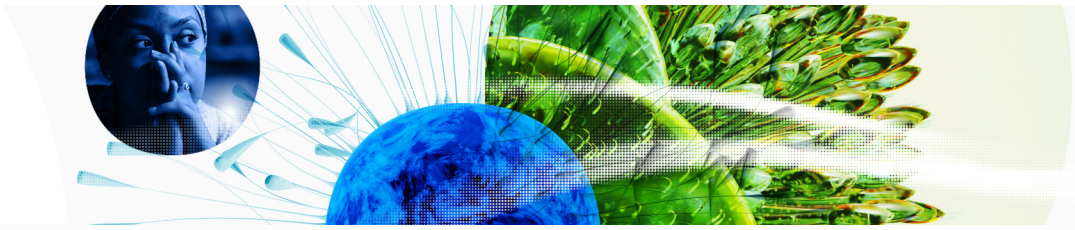
was equal to an average score of 17.4 for the top 3 universities in 2022, up by 2.78% from the year prior – and equivalent to an indicator rank of 56.

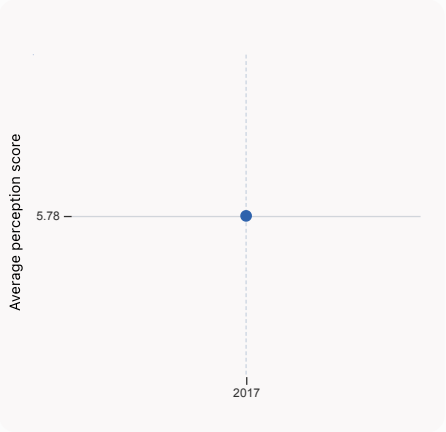


3.1.1 ICT access

was equal to a score of 9.32 in 2021, up by 0.22% from the year prior – and equivalent to an indicator rank of 23.

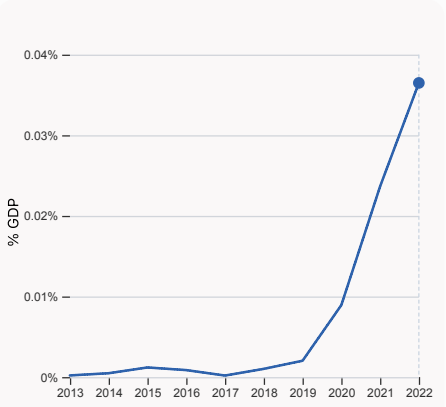
Global Innovation Index 2023





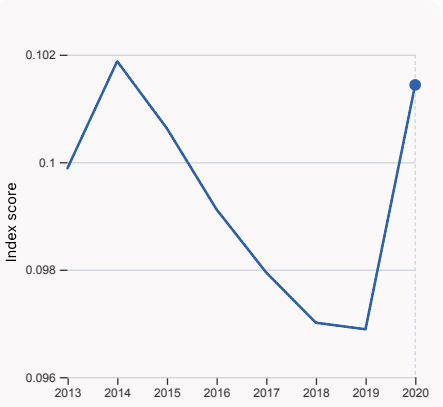
4.1.1 Finance for startups and scaleups

was equal to an average perception score of 5.78 in 2017, equivalent to an indicator rank of 11.



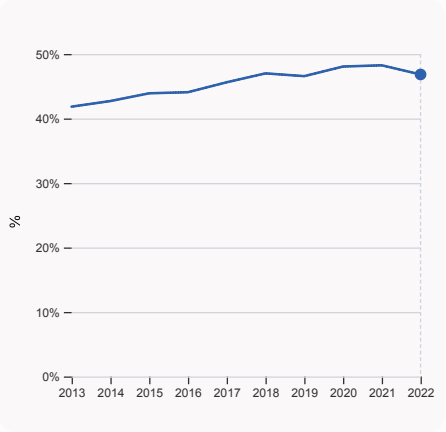
4.2.4 VC received, value, % GDP

was equal to 0.03649% GDP in 2022, up by 0.013 percentage points from the year prior – and equivalent to an indicator rank of 1.



4.3.2 Domestic industry diversification

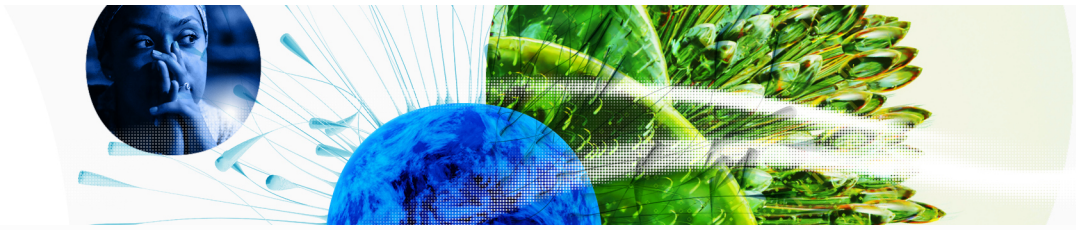
was equal to an index score of 0.101 in 2020, up by 4.69% from the year prior – and equivalent to an indicator rank of 17.



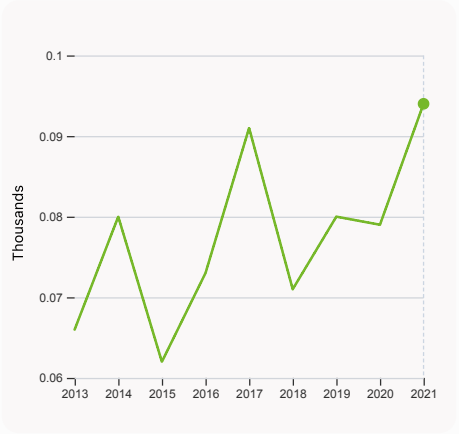
5.1.1 Knowledge-intensive employment, %

was equal to 46.83% in 2022, down by 1.42 percentage points from the year prior – and equivalent to an indicator rank of 17.

Global Innovation Index 2023

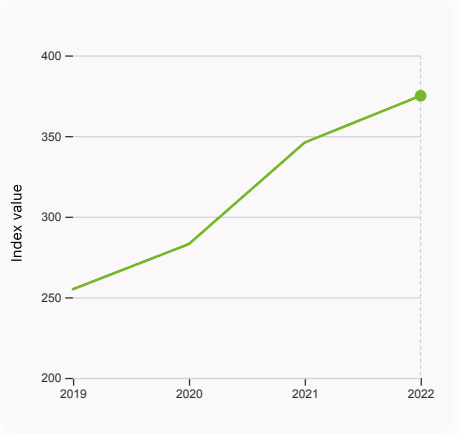


> Innovation outputs in Estonia



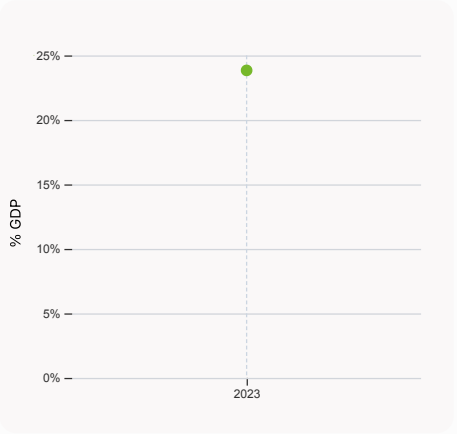
6.1.1 Patents by origin

was equal to 0.094 Thousands in 2021, up by 18.99% from the year prior – and equivalent to an indicator rank of 41.



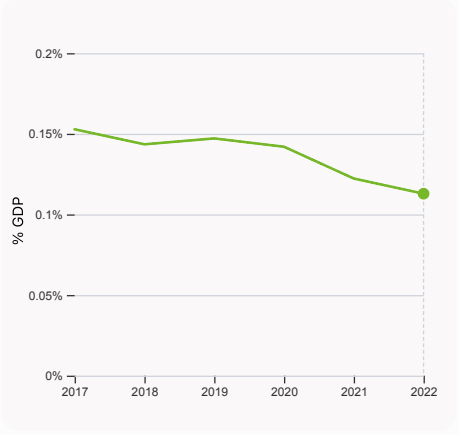
6.1.5 Citable documents H-index

was equal to an index value of 375 in 2022, up by 8.38% from the year prior – and equivalent to an indicator rank of 48.



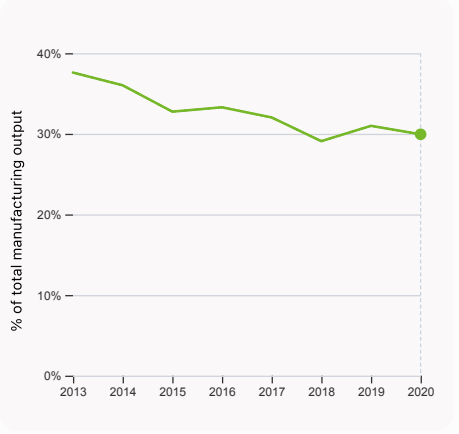
6.2.2 Unicorn valuation, % GDP

was equal to 23.84 % GDP in 2023 – and equivalent to an indicator rank of 1.



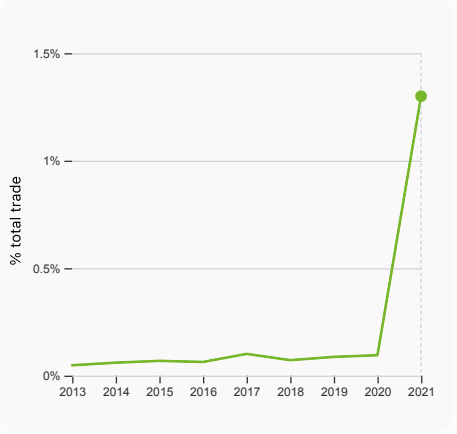
6.2.3 Software spending, % GDP

was equal to 0.113% GDP in 2022, down by 0.0094 percentage points from the year prior – and equivalent to an indicator rank of 89.



6.2.4 High-tech manufacturing, %

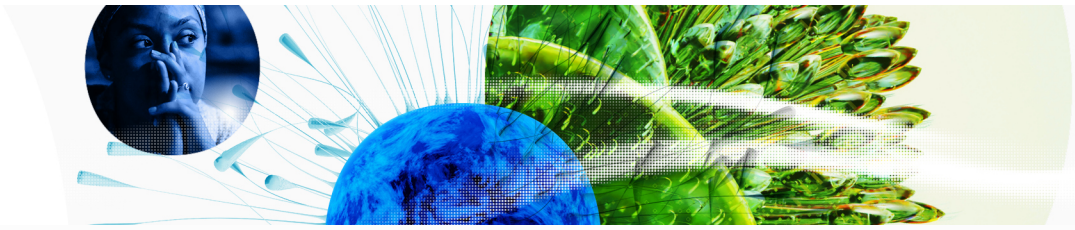
was equal to 29.94% of total manufacturing output in 2020, down by 1.05 percentage points from the year prior – and equivalent to an indicator rank of 37.

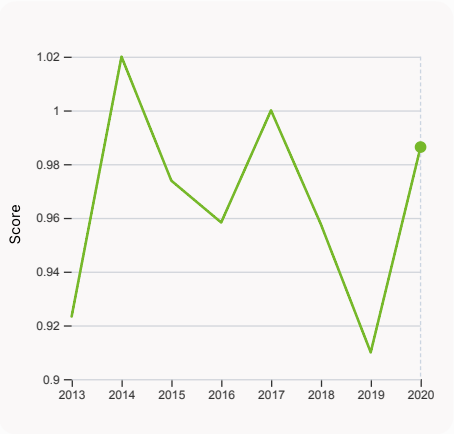


6.3.1 Intellectual property receipts, % total trade

was equal to 1.3% total trade in 2021, up by 1.2 percentage points from the year prior – and equivalent to an indicator rank of 27.

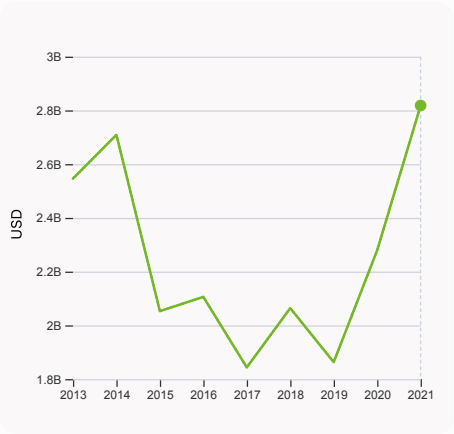
Global Innovation Index 2023





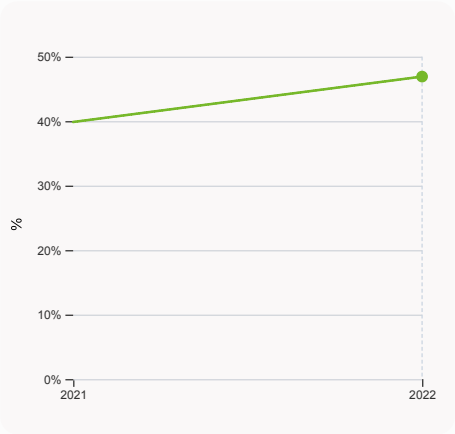
6.3.2 Production and export complexity

was equal to a score of 0.986 in 2020, up by 8.4% from the year prior – and equivalent to an indicator rank of 27.



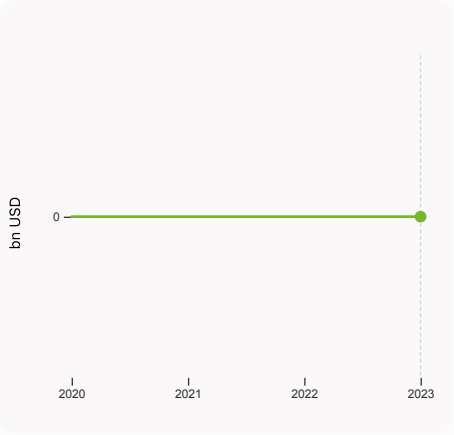
6.3.3 High-tech exports

was equal to 2,818,161,795 USD in 2021, up by 23.64% from the year prior – and equivalent to an indicator rank of 18.



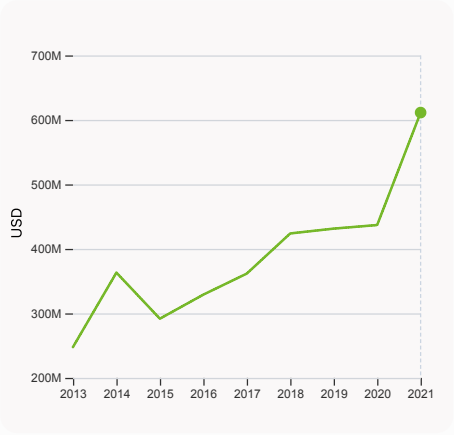
7.1.1 Intangible asset intensity, top 15, %

was equal to 46.91% in 2022, up by 7.04 percentage points from the year prior – and equivalent to an indicator rank of 53.



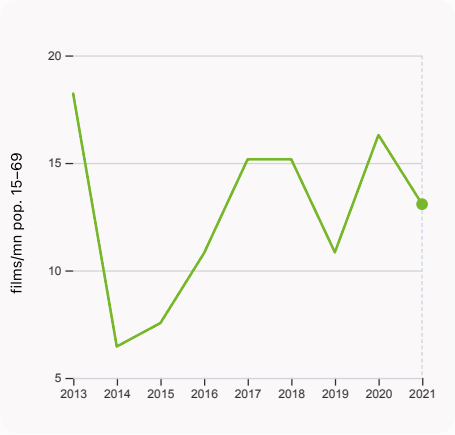
7.1.3 Global brand value, top 5,000

was equal to 0 bn USD in 2023 – and equivalent to an indicator rank of 74.



7.2.1 Cultural and creative services exports

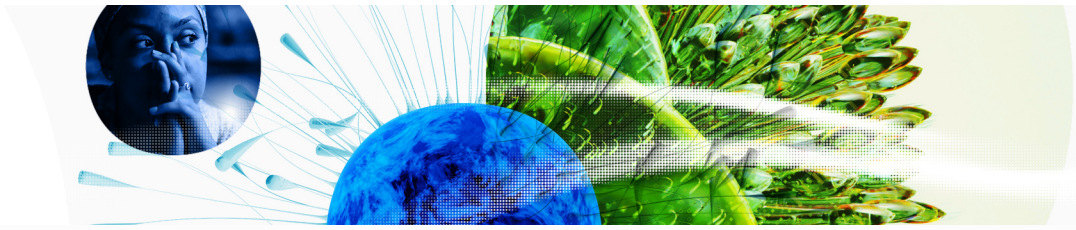
was equal to 611,368,000 USD in 2021, up by 39.9% from the year prior – and equivalent to an indicator rank of 11.

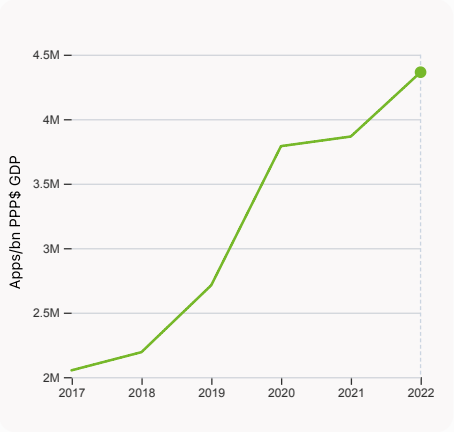


7.2.2 National feature films/mn pop. 15-69

was equal to 13.08 films/mn pop. 15–69 in 2021, down by 19.75% from the year prior – and equivalent to an indicator rank of 3.

Global Innovation Index 2023

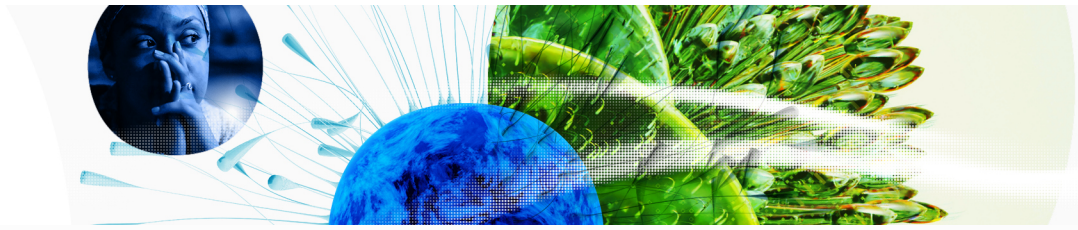




7.3.4 Mobile app creation/bn PPP$ GDP

was equal to 4,363,930.98 Apps/bn PPP$ GDP in 2022, up by 12.9% from the year prior – and equivalent to an indicator rank of 6.

Global Innovation Index 2023



→ Estonia's innovation top performers

> 2.3.4 QS university ranking of Estonia's top universities

Rank	University	Score
296	UNIVERSITY OF TARTU	35.40
701-750	TALLINN UNIVERSITY OF TECHNOLOGY (TALTECH)	16.80
1001-1200	TALLINN UNIVERSITY	10.30

Source: QS Quacquarelli Symonds Ltd (https://www.topuniversities.com/university-rankings/world-university-rankings/2023).
Note: QS Quacquarelli Symonds Ltd annually assesses over 1,200 universities across the globe and scores them between [0,100]. Ranks can represent a single value "x", a tie "x=" or a range "x-y".

> 6.2.2 Top Unicorn Companies in Estonia

Rank	Unicorn Company	Industry	City	Valuation, bn USD
1	BOLT	Auto & transportation	Tallinn	8
2	VERIFF	Artificial intelligence	Tallinn	2

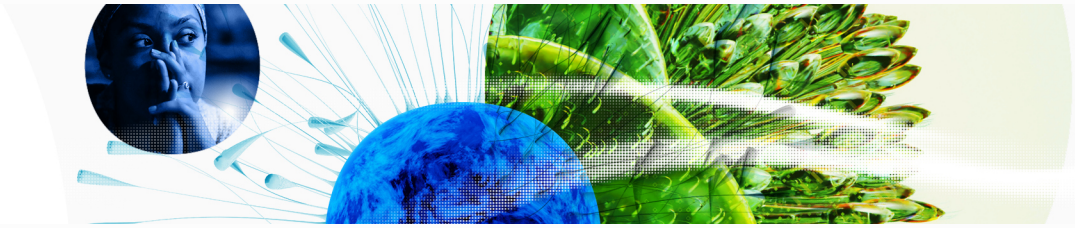
Source: CBInsights, Tracker – The Complete List of Unicorn Companies: https://www.cbinsights.com/research-unicorn-companies

> 7.1.1 Top 15 intangible-asset intensive companies in Estonia

Rank	Firm	Intensity, %
1	LHV GROUP AS	55.14
2	ENEFIT GREEN AS	38.85
3	TALLINNA KAUBAMAJA GRUPP AS	19.29

Source: Brand Finance (https://brandirectory.com/reports/gift-2022).
Note: Brand Finance only provides within economy ranks.

Global Innovation Index 2023



Estonia

GII 2023 rank
16

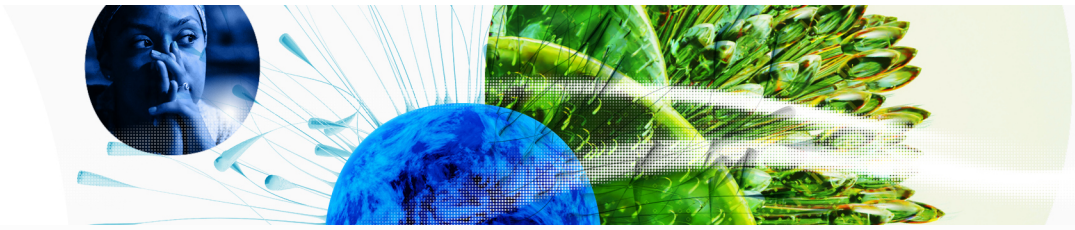
Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
16	14	High	EUR	1.3	61.4	46,126.0

	Score / Value	Rank	
Institutions	**78.6**	**11**	
1.1 Institutional environment	**75.3**	**17**	
1.1.1 Operational stability for businesses*	75.7	15	
1.1.2 Government effectiveness*	74.9	19	
1.2 Regulatory environment	**86.2**	**16**	
1.2.1 Regulatory quality*	82.6	15	
1.2.2 Rule of law*	81.5	18	
1.2.3 Cost of redundancy dismissal	12.9	40	
1.3 Business environment	**74.3**	**16**	
1.3.1 Policies for doing business†	60.7	37	
1.3.2 Entrepreneurship policies and culture†	88.0	3	●
Human capital and research	**42.9**	**34**	◇
2.1 Education	**62.5**	**21**	
2.1.1 Expenditure on education, % GDP	5.3	26	
2.1.2 Government funding/pupil, secondary, % GDP/cap	20.3	51	○
2.1.3 School life expectancy, years	16.0	39	
2.1.4 PISA scales in reading, maths and science	525.5	4	●
2.1.5 Pupil-teacher ratio, secondary	9.8	29	
2.2 Tertiary education	**43.4**	**24**	
2.2.1 Tertiary enrolment, % gross	69.0	43	
2.2.2 Graduates in science and engineering, %	27.5	31	
2.2.3 Tertiary inbound mobility, %	12.3	20	
2.3 Research and development (R&D)	**22.7**	**42**	◇
2.3.1 Researchers, FTE/mn pop.	4,037.4	27	
2.3.2 Gross expenditure on R&D, % GDP	1.8	22	
2.3.3 Global corporate R&D investors, top 3, mn US$	0.0	40	○ ◇
2.3.4 QS university ranking, top 3*	17.6	56	◇
Infrastructure	**64.3**	**5**	
3.1 Information and communication technologies (ICTs)	**95.6**	**2**	
3.1.1 ICT access*	90.0	23	
3.1.2 ICT use*	94.8	12	
3.1.3 Government's online service*	100.0	1	●
3.1.4 E-participation*	97.7	3	●
3.2 General infrastructure	**40.1**	**33**	
3.2.1 Electricity output, GWh/mn pop.	5,500.4	40	
3.2.2 Logistics performance*	68.2	25	◇
3.2.3 Gross capital formation, % GDP	26.6	41	
3.3 Ecological sustainability	**57.2**	**9**	
3.3.1 GDP/unit of energy use	9.5	76	○
3.3.2 Environmental performance*	72.0	14	
3.3.3 ISO 14001 environment/bn PPP$ GDP	10.0	4	●
Market sophistication	**67.6**	**5**	
4.1 Credit	**50.8**	**27**	
4.1.1 Finance for startups and scaleups†	76.0	11	
4.1.2 Domestic credit to private sector, % GDP	63.4	57	◇
4.1.3 Loans from microfinance institutions, % GDP	4.6	8	
4.2 Investment	**89.2**	**2**	
4.2.1 Market capitalization, % GDP	n/a	n/a	
4.2.2 Venture capital (VC) investors, deals/bn PPP$ GDP	1.3	5	
4.2.3 VC recipients, deals/bn PPP$ GDP	0.7	1	●
4.2.4 VC received, value, % GDP	0.0	1	●
4.3 Trade, diversification, and market scale	**62.9**	**46**	
4.3.1 Applied tariff rate, weighted avg., %	1.5	20	
4.3.2 Domestic industry diversification	97.0	17	
4.3.3 Domestic market scale, bn PPP$	61.4	101	○

	Score / Value	Rank	
Business sophistication	**49.2**	**25**	◇
5.1 Knowledge workers	**58.8**	**22**	
5.1.1 Knowledge-intensive employment, %	46.8	17	
5.1.2 Firms offering formal training, %	40.7	31	
5.1.3 GERD performed by business, % GDP	1.0	23	
5.1.4 GERD financed by business, %	50.1	29	
5.1.5 Females employed w/advanced degrees, %	28.1	8	
5.2 Innovation linkages	**37.3**	**30**	◇
5.2.1 University-industry R&D collaboration†	54.1	44	◇
5.2.2 State of cluster development†	41.9	62	○ ◇
5.2.3 GERD financed by abroad, % GDP	0.2	19	
5.2.4 Joint venture/strategic alliance deals/bn PPP$ GDP	0.1	18	
5.2.5 Patent families/bn PPP$ GDP	0.9	28	◇
5.3 Knowledge absorption	**51.5**	**17**	
5.3.1 Intellectual property payments, % total trade	0.3	87	○ ◇
5.3.2 High-tech imports, % total trade	8.4	60	○
5.3.3 ICT services imports, % total trade	10.0	1	●
5.3.4 FDI net inflows, % GDP	13.7	8	
5.3.5 Research talent, % in businesses	43.2	33	◇
Knowledge and technology outputs	**43.7**	**20**	
6.1 Knowledge creation	**28.4**	**34**	◇
6.1.1 Patents by origin/bn PPP$ GDP	1.7	41	◇
6.1.2 PCT patents by origin/bn PPP$ GDP	0.6	30	◇
6.1.3 Utility models by origin/bn PPP$ GDP	0.6	30	
6.1.4 Scientific and technical articles/bn PPP$ GDP	n/a	n/a	
6.1.5 Citable documents H-index	18.5	48	◇
6.2 Knowledge impact	**52.4**	**10**	
6.2.1 Labor productivity growth, %	1.9	35	
6.2.2 Unicorn valuation, % GDP	23.8	1	●
6.2.3 Software spending, % GDP	0.1	89	○ ◇
6.2.4 High-tech manufacturing, %	29.9	37	
6.3 Knowledge diffusion	**50.3**	**17**	
6.3.1 Intellectual property receipts, % total trade	0.5	27	◇
6.3.2 Production and export complexity	73.2	27	
6.3.3 High-tech exports, % total trade	9.7	18	
6.3.4 ICT services exports, % total trade	7.2	8	
6.3.5 ISO 9001 quality/bn PPP$ GDP	17.9	16	
Creative outputs	**48.8**	**15**	
7.1 Intangible assets	**48.3**	**29**	
7.1.1 Intangible asset intensity, top 15, %	46.9	53	○ ◇
7.1.2 Trademarks by origin/bn PPP$ GDP	104.1	9	
7.1.3 Global brand value, top 5,000	0.0	74	○ ◇
7.1.4 Industrial designs by origin/bn PPP$ GDP	4.2	24	
7.2 Creative goods and services	**47.2**	**7**	
7.2.1 Cultural and creative services exports, % total trade	2.1	11	
7.2.2 National feature films/mn pop. 15-69	13.1	3	●
7.2.3 Entertainment and media market/th pop. 15-69	n/a	n/a	
7.2.4 Creative goods exports, % total trade	1.3	40	
7.3 Online creativity	**51.3**	**23**	
7.3.1 Generic top-level domains (TLDs)/th pop. 15-69	13.1	37	◇
7.3.2 Country-code TLDs/th pop. 15-69	50.1	17	
7.3.3 GitHub commits/mn pop. 15-69	58.1	13	
7.3.4 Mobile app creation/bn PPP$ GDP	83.9	6	

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/gii-ranking. Square brackets [ ] indicate that the data minimum coverage (DMC) requirements were not met at the sub-pillar or pillar level.

Global Innovation Index 2023



→ Data availability

The following tables list indicators that are either missing or outdated for Estonia.

> Estonia has missing data for two indicators and outdated data for four indicators.

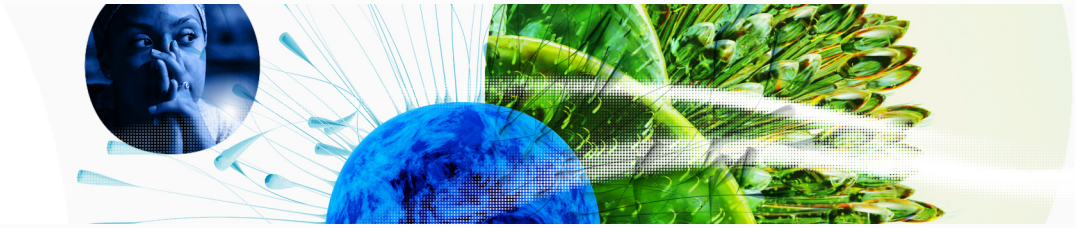
> Missing data for Estonia

Code	Indicator name	Economy Year	Model Year	Source
4.2.1	Market capitalization, % GDP	n/a	2020	World Federation of Exchanges; World Bank
7.2.3	Entertainment and media market/th pop. 15-69	n/a	2022	PwC, GEMO; United Nations, World Population Prospects; International Monetary Fund

> Outdated data for Estonia

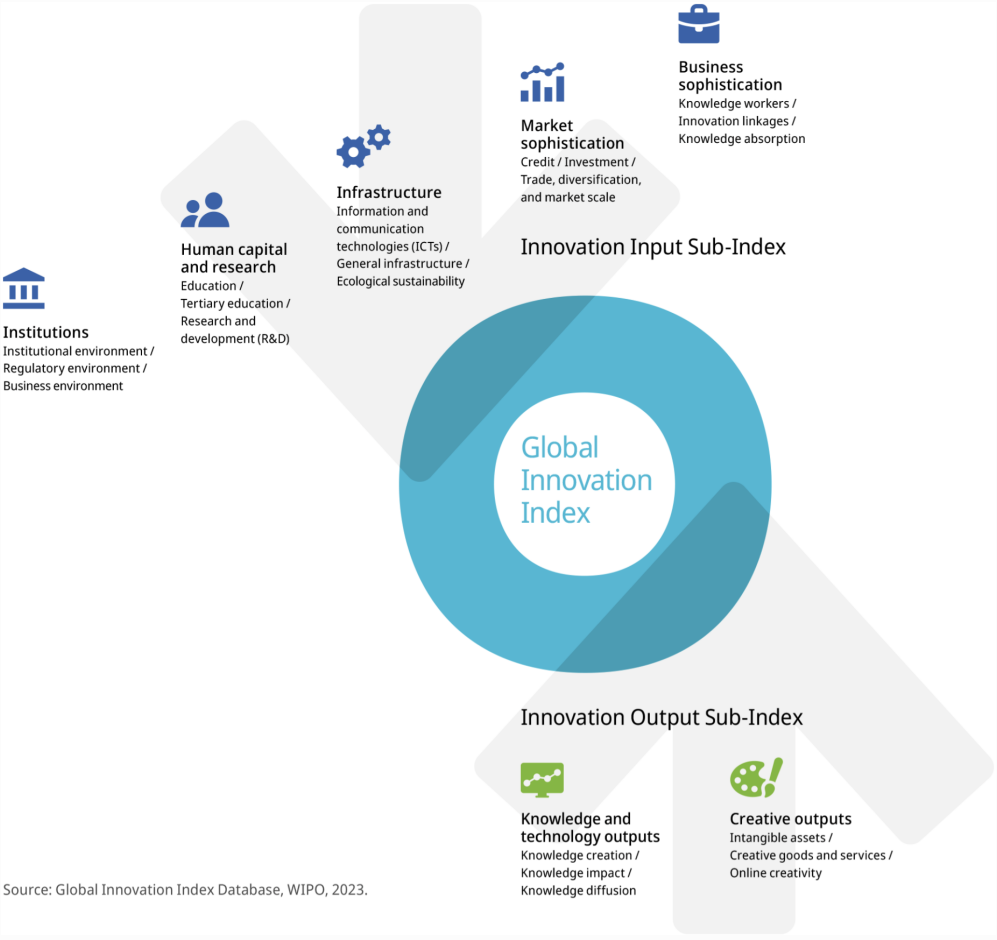
Code	Indicator name	Economy Year	Model Year	Source
1.3.2	Entrepreneurship policies and culture	2017	2022	Global Entrepreneurship Monitor
2.1.1	Expenditure on education, % GDP	2019	2021	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	2017	2020	UNESCO Institute for Statistics
4.1.1	Finance for startups and scaleups	2017	2022	Global Entrepreneurship Monitor

Global Innovation Index 2023



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 Database, WIPO, 2023.

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.