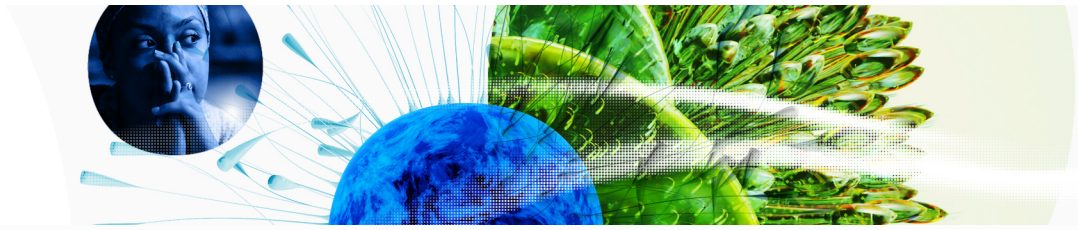
Global Innovation Index 2023



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**.

North Macedonia ranking in the Global Innovation Index 2023

> North Macedonia ranks 54th among the 132 economies featured in the GII 2023.

> North Macedonia ranks 9th among the 33 upper-middle-income group economies.

> North Macedonia ranks 33rd among the 39 economies in Europe.

> North Macedonia GII Ranking (2020-2023)

The table shows the rankings of North Macedonia 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 North Macedonia in the GII 2023 is between ranks 51 and 59.

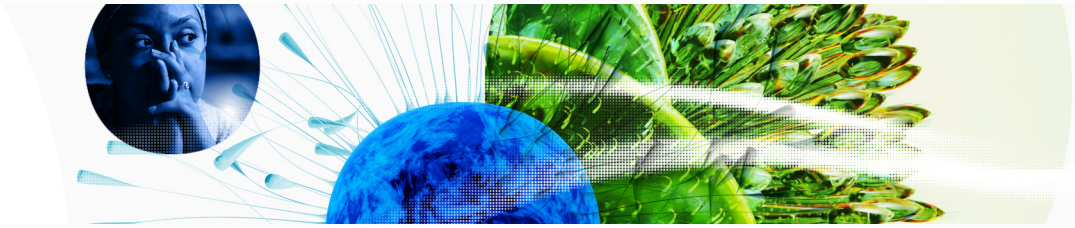
	GII Position	Innovation Inputs	Innovation Outputs
2020	57th	46th	63rd
2021	59th	40th	69th
2022	66th	60th	77th
2023	54th	49th	58th

North Macedonia performs worse in innovation outputs than innovation inputs in 2023.

This year North Macedonia ranks 49th in innovation inputs. This position is higher than last year.

North Macedonia ranks 58th in innovation outputs. This position is higher than last year.

Global Innovation Index 2023



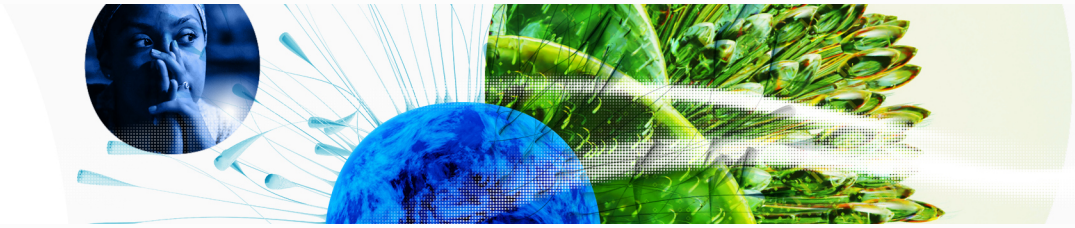
→ Expected vs. observed innovation performance

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.

> Relative to GDP, North Macedonia is performing above expectations for its level of development.

> Innovation overperformers relative to their economic development

Global Innovation Index 2023

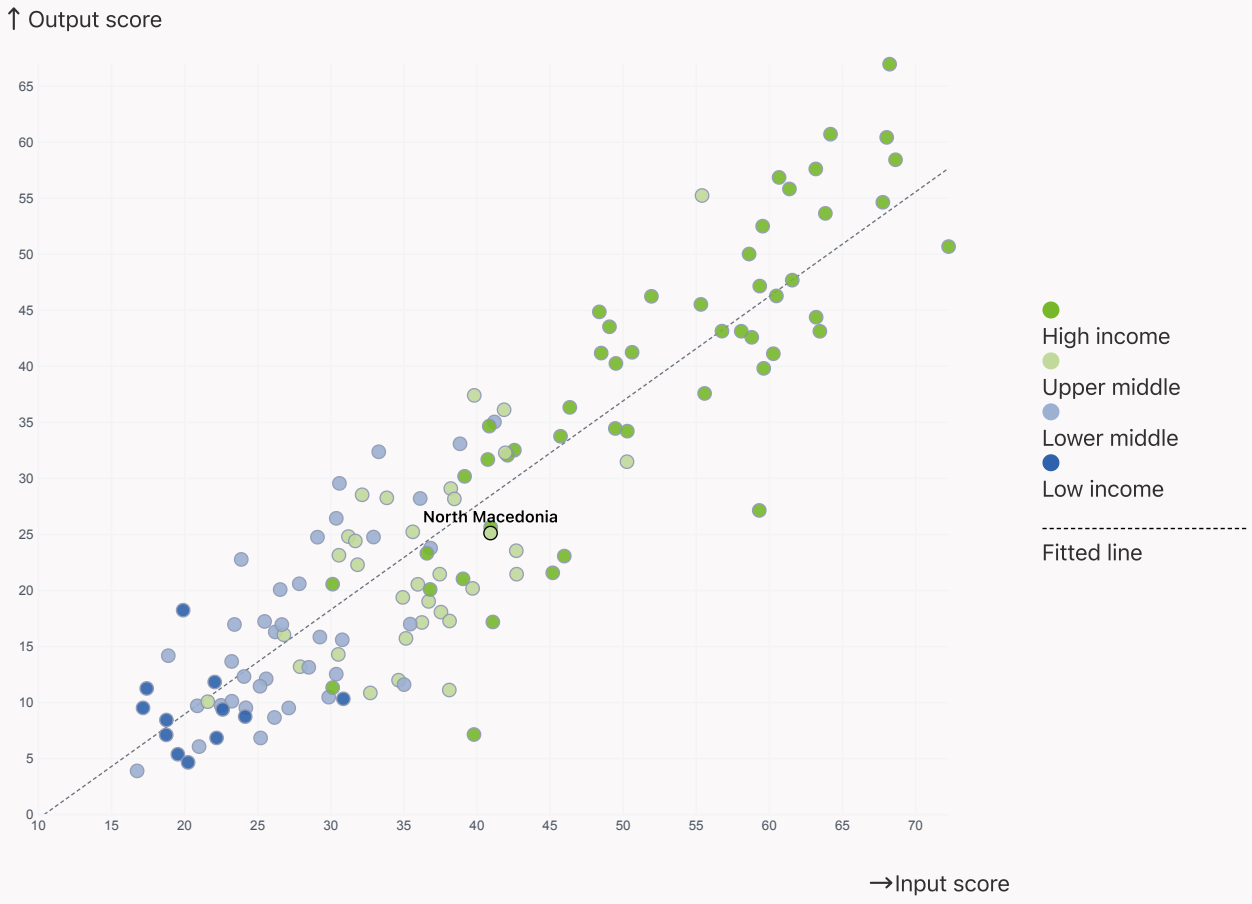


→ Effectively translating innovation investments into innovation outputs

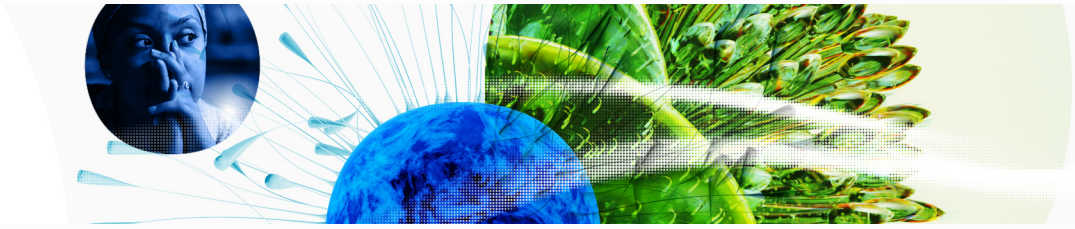
The chart below shows the relationship between innovation inputs and innovation outputs. Economies above the line are effectively translating costly innovation investments into more and higher-quality outputs.

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

> Relationship between innovation inputs and outputs

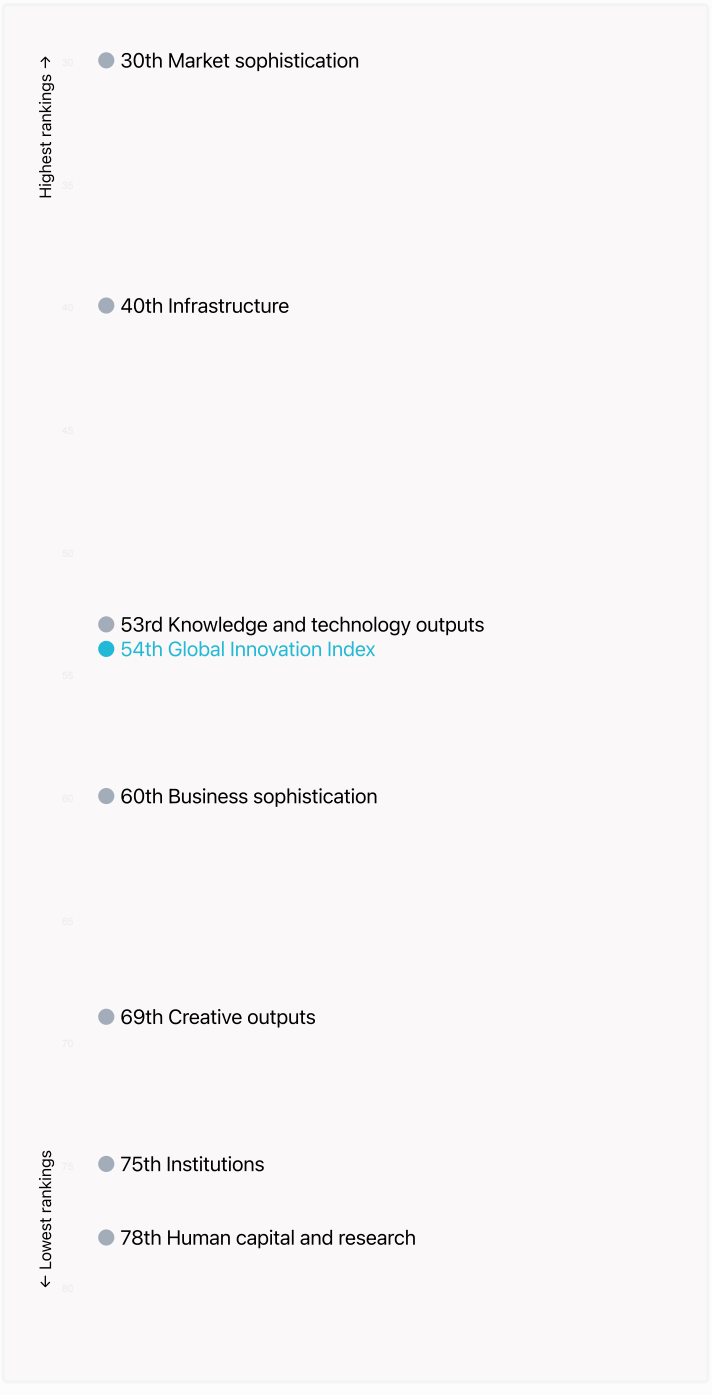


Global Innovation Index 2023



→ Overview of North Macedonia'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 North Macedonia are those that rank above the GII (shown in blue) and the weakest are those that rank below.



> Highest rankings

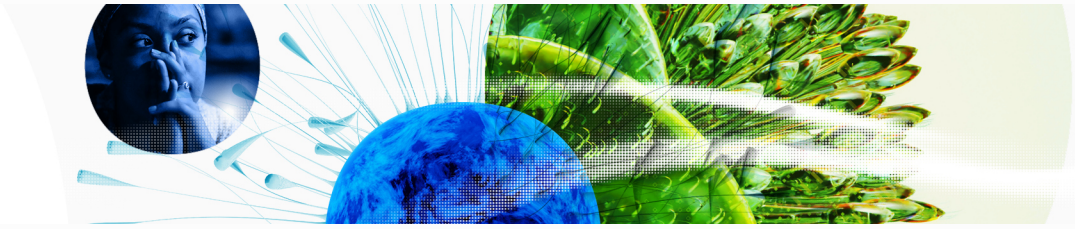
North Macedonia ranks highest in Market sophistication (30th), Infrastructure (40th) and Knowledge and technology outputs (53rd).

> Lowest rankings

North Macedonia ranks lowest in Human capital and research (78th), Institutions (75th) and Creative outputs (69th).

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

Global Innovation Index 2023



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

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

> Upper-Middle-Income economies

North Macedonia performs above the upper-middle-income group average in Knowledge and technology outputs, Creative outputs, Market sophistication, Infrastructure.

> Europe

North Macedonia performs below the regional average in Knowledge and technology outputs, Creative outputs, Business sophistication, Human capital and research, Infrastructure, Institutions.

Knowledge and technology outputs

- Top 10 | Score: 58.96
- Europe | Score: 38.80
- North Macedonia | Score: 26.63
- Upper middle income | Score: 22.36

Creative outputs

- Top 10 | 56.09
- Europe | 39.87
- North Macedonia | 23.51
- Upper middle income | 23.16

Business sophistication

- Top 10 | 64.39
- Europe | 44.61
- Upper middle income | 29.27
- North Macedonia | 29.21

Market sophistication

- Top 10 | 61.93
- North Macedonia | 47.12
- Europe | 43.65
- Upper middle income | 35.45

Human capital and research

- Top 10 | 60.28
- Europe | 44.05
- Upper middle income | 29.68
- North Macedonia | 28.06

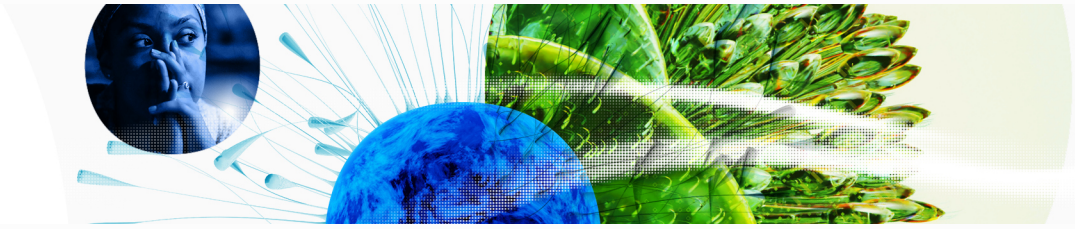
Infrastructure

- Top 10 | 62.83
- Europe | 54.69
- North Macedonia | 53.27
- Upper middle income | 40.40

Institutions

- Top 10 | 79.85
- Europe | 61.69
- Upper middle income | 47.71
- North Macedonia | 47.19

Global Innovation Index 2023



→ Innovation strengths and weaknesses in North Macedonia

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

> North Macedonia's main innovation strengths are **ISO 14001 environment/bn PPP$ GDP** (rank 3), **High-tech manufacturing, %** (rank 11) and **Pupil-teacher ratio, secondary** (rank 11).

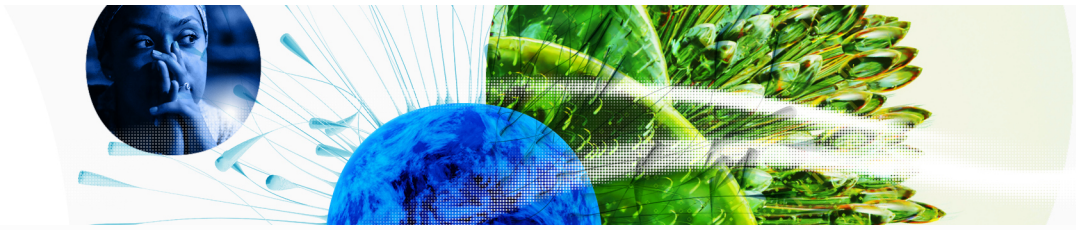
Strengths

Rank	Code	Indicator name
3	3.3.3	ISO 14001 environment/bn PPP$ GDP
11	6.2.4	High-tech manufacturing, %
11	2.1.5	Pupil-teacher ratio, secondary
13	6.3.5	ISO 9001 quality/bn PPP$ GDP
15	5.3.1	Intellectual property payments, % total trade
25	7.2.2	National feature films/mn pop. 15-69
26	7.2.1	Cultural and creative services exports, % total trade
29	6.3.4	ICT services exports, % total trade
32	3.3.2	Environmental performance
40	7.1.2	Trademarks by origin/bn PPP$ GDP

Weaknesses

Rank	Code	Indicator name
117	4.3.3	Domestic market scale, bn PPP$
116	1.3.1	Policies for doing business
110	5.2.1	University-industry R&D collaboration
95	5.2.5	Patent families/bn PPP$ GDP
75	7.1.1	Intangible asset intensity, top 15, %
74	7.1.3	Global brand value, top 5,000
71	2.3.4	QS university ranking, top 3
67	2.1.4	PISA scales in reading, maths and science
48	6.2.2	Unicorn valuation, % GDP
40	2.3.3	Global corporate R&D investors, top 3, mn US$

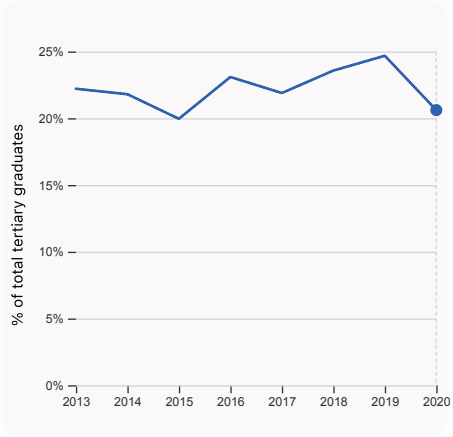
Global Innovation Index 2023



→ North Macedonia's innovation system

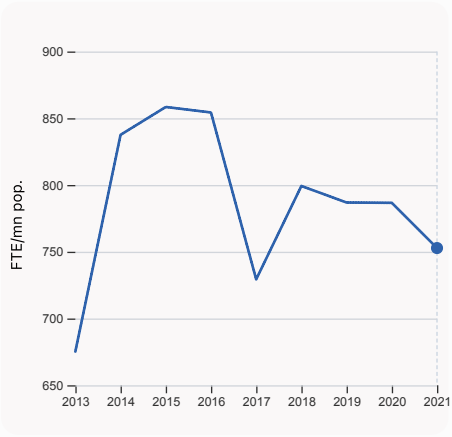
As far as practicable, the plots below present unscaled indicator data.

> Innovation inputs in North Macedonia



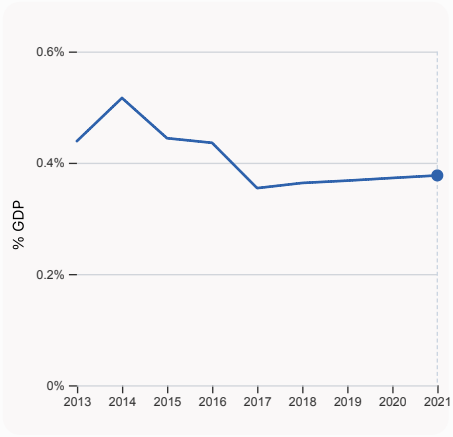
2.2.2 Graduates in science and engineering, %

was equal to 20.61% of total tertiary graduates in 2020, down by 4.07 percentage points from the year prior – and equivalent to an indicator rank of 67.



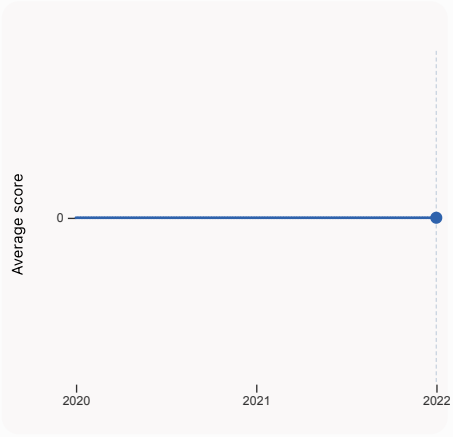
2.3.1 Researchers, FTE/mn pop.

was equal to 752.78 FTE/mn pop. in 2021, down by 4.3% from the year prior – and equivalent to an indicator rank of 61.



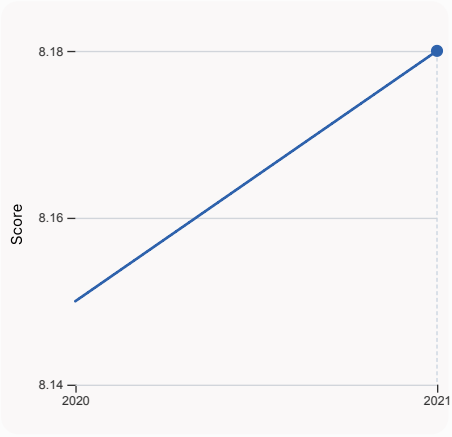
2.3.2 Gross expenditure on R&D, % GDP

was equal to 0.377% GDP in 2021, up by 0.0045 percentage points from the year prior – and equivalent to an indicator rank of 67.



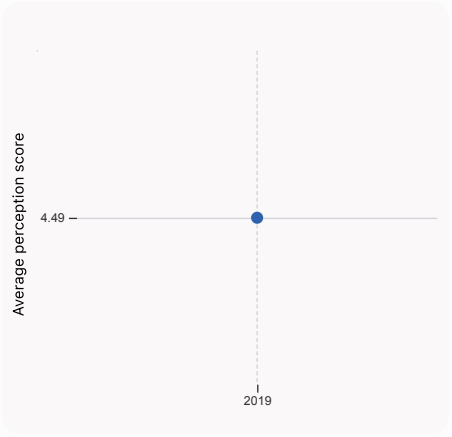
2.3.4 QS university ranking, top 3

was equal to an average score of 0 for the top 3 universities in 2022, equivalent to an indicator rank of 71.



3.1.1 ICT access

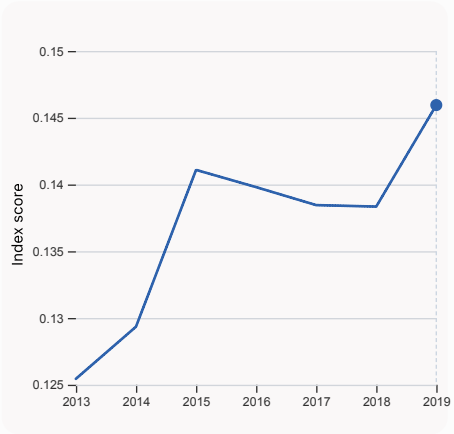
was equal to a score of 8.18 in 2021, up by 0.37% from the year prior – and equivalent to an indicator rank of 85.

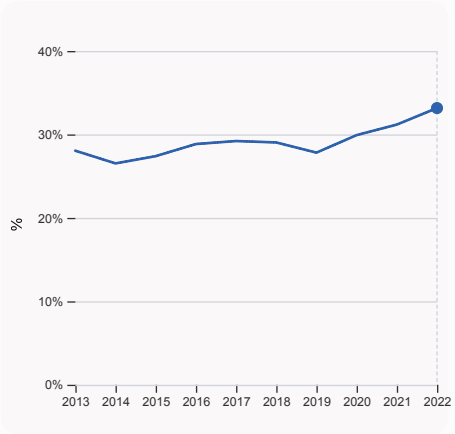


4.1.1 Finance for startups and scaleups

was equal to an average perception score of 4.49 in 2019, equivalent to an indicator rank of 49.

Global Innovation Index 2023





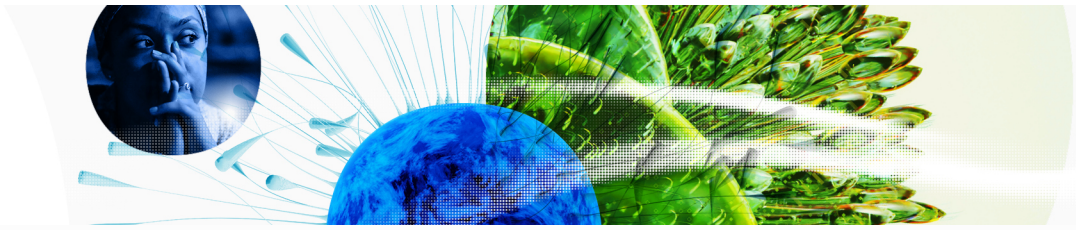
4.3.2 Domestic industry diversification

was equal to an index score of 0.146 in 2019, up by 5.5% from the year prior – and equivalent to an indicator rank of 44.

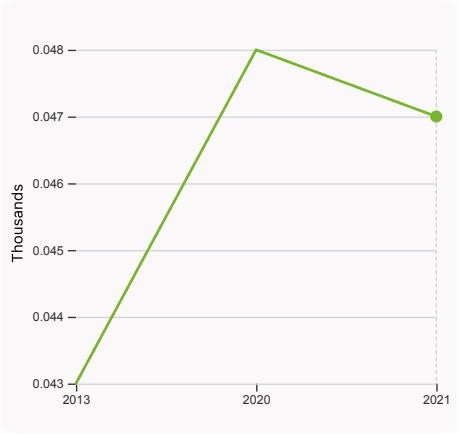
5.1.1 Knowledge-intensive employment, %

was equal to 33.16% in 2022, up by 1.98 percentage points from the year prior – and equivalent to an indicator rank of 44.

Global Innovation Index 2023

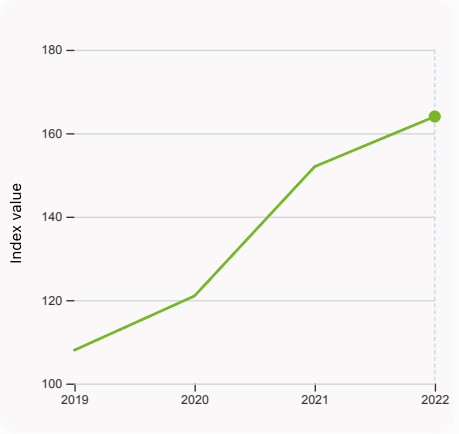


> Innovation outputs in North Macedonia



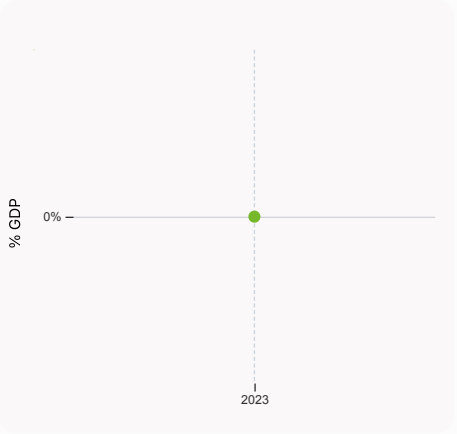
6.1.1 Patents by origin

was equal to 0.047 Thousands in 2021, down by 2.083% from the year prior – and equivalent to an indicator rank of 52.



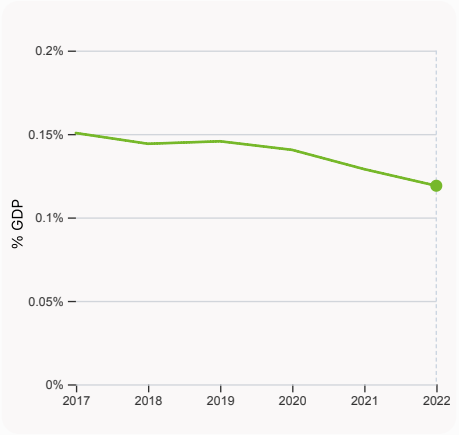
6.1.5 Citable documents H-index

was equal to an index value of 164 in 2022, up by 7.89% from the year prior – and equivalent to an indicator rank of 91.



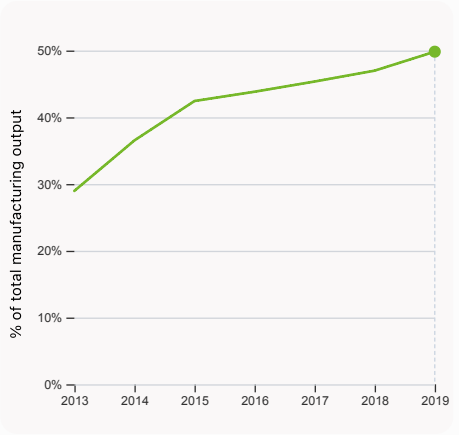
6.2.2 Unicorn valuation, % GDP

was equal to 0 % GDP in 2023 – and equivalent to an indicator rank of 48.



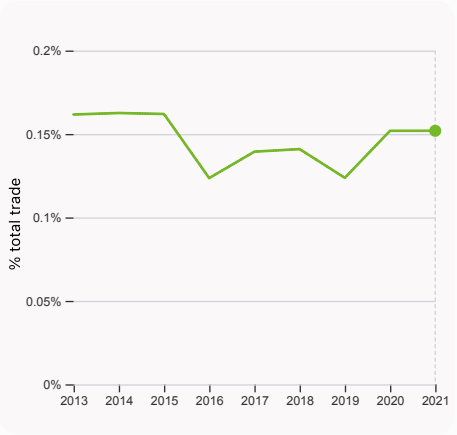
6.2.3 Software spending, % GDP

was equal to 0.119% GDP in 2022, down by 0.0099 percentage points from the year prior – and equivalent to an indicator rank of 87.



6.2.4 High-tech manufacturing, %

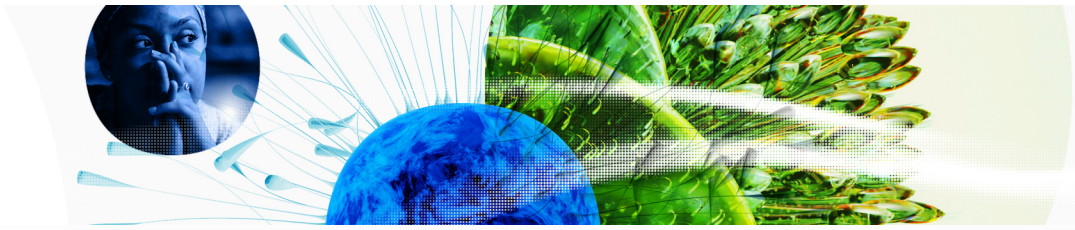
was equal to 49.83% of total manufacturing output in 2019, up by 2.84 percentage points from the year prior – and equivalent to an indicator rank of 11.



6.3.1 Intellectual property receipts, % total trade

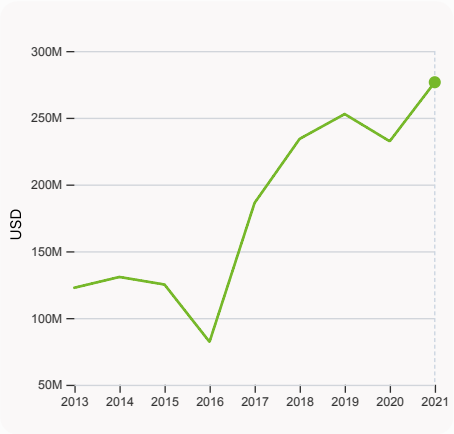
was equal to 0.152% total trade in 2021, up by 0.000017 percentage points from the year prior – and equivalent to an indicator rank of 48.

Global Innovation Index 2023



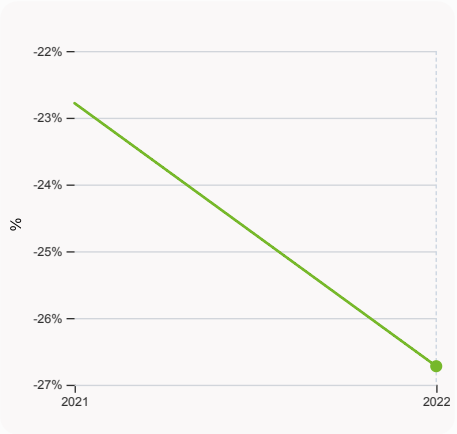
6.3.2 Production and export complexity

was equal to a score of 0.073 in 2020, up by 201.77% from the year prior – and equivalent to an indicator rank of 57.



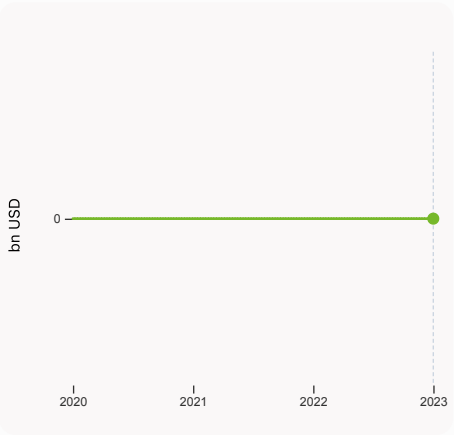
6.3.3 High-tech exports

was equal to 276,602,844 USD in 2021, up by 19.027% from the year prior – and equivalent to an indicator rank of 50.



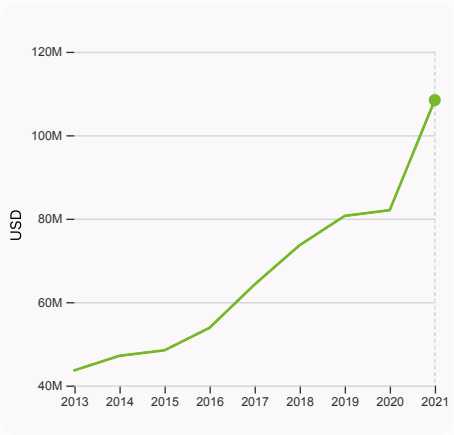
7.1.1 Intangible asset intensity, top 15, %

was equal to -26.722% in 2022, down by 3.94 percentage points from the year prior – and equivalent to an indicator rank of 75.



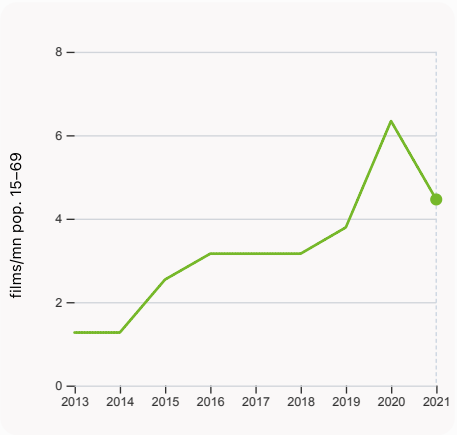
7.1.3 Global brand value, top 5,000

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



7.2.1 Cultural and creative services exports

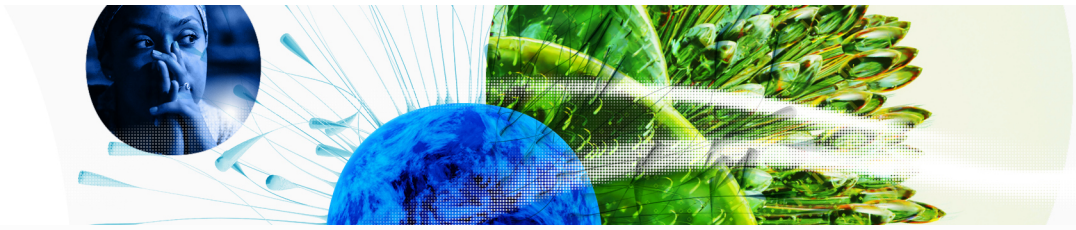
was equal to 108,414,000 USD in 2021, up by 32.16% from the year prior – and equivalent to an indicator rank of 26.

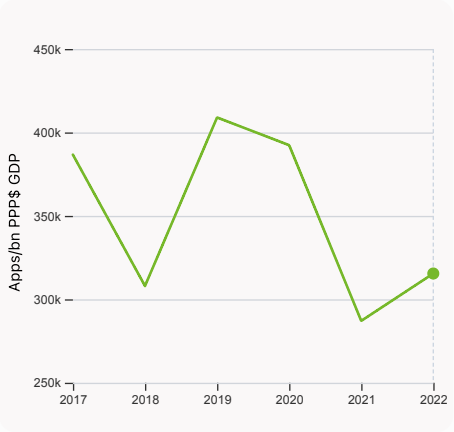


7.2.2 National feature films/mn pop. 15-69

was equal to 4.46 films/mn pop. 15–69 in 2021, down by 29.65% from the year prior – and equivalent to an indicator rank of 25.

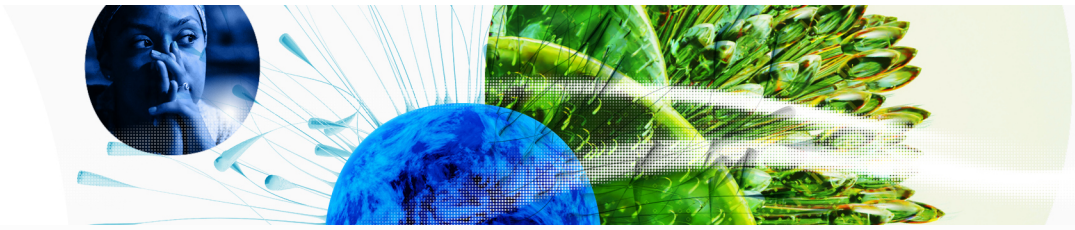
Global Innovation Index 2023





7.3.4 Mobile app creation/bn PPP$ GDP

was equal to 315,463.26 Apps/bn PPP$ GDP in 2022, up by 9.88% from the year prior – and equivalent to an indicator rank of 56.



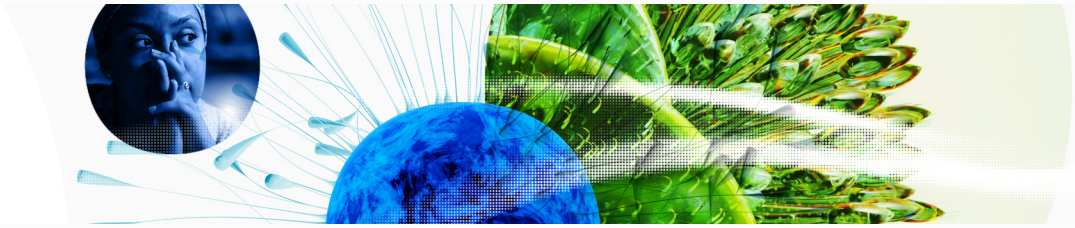
→ North Macedonia's innovation top performers

> 7.1.1 Top 15 intangible-asset intensive companies in North Macedonia

Rank	Firm	Intensity, %
1	ALKALOID AD SKOPJE	49.80
2	MERMEREN KOMBINAT AD PRILEP	76.70
3	KOMERCIJALNA BANKA AD SKOPJE	27.25

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

Global Innovation Index 2023



North Macedonia

GII 2023 rank **54**

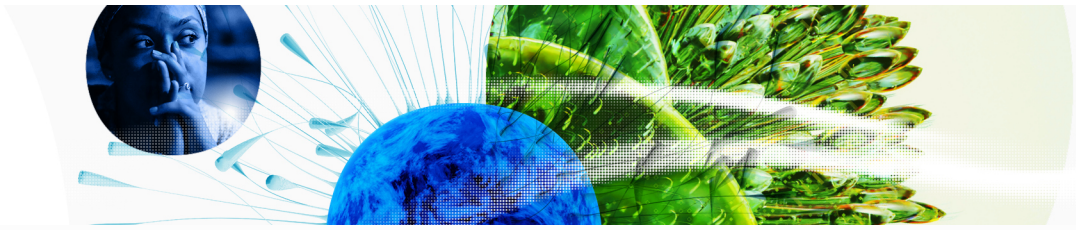
Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
58	49	Upper middle	EUR	2.1	40.9	19,783.0

	Score / Value	Rank
Institutions	**47.2**	**75**
1.1 Institutional environment	**46.4**	**64**
1.1.1 Operational stability for businesses*	58.3	49
1.1.2 Government effectiveness*	34.4	76
1.2 Regulatory environment	**66.2**	**54**
1.2.1 Regulatory quality*	52.9	52
1.2.2 Rule of law*	37.5	65
1.2.3 Cost of redundancy dismissal	14.4	57
1.3 Business environment	**29.0**	**103**
1.3.1 Policies for doing business†	24.7	116 ○
1.3.2 Entrepreneurship policies and culture†	33.3	55
Human capital and research	**28.1**	**78**
2.1 Education	**56.2**	**53**
2.1.1 Expenditure on education, % GDP	n/a	n/a
2.1.2 Government funding/pupil, secondary, % GDP/cap	n/a	n/a
2.1.3 School life expectancy, years	13.2	81
2.1.4 PISA scales in reading, maths and science	400.1	67 ○
2.1.5 Pupil-teacher ratio, secondary	8.1	11 ●
2.2 Tertiary education	**24.4**	**81**
2.2.1 Tertiary enrolment, % gross	43.0	75
2.2.2 Graduates in science and engineering, %	20.6	67
2.2.3 Tertiary inbound mobility, %	5.0	48
2.3 Research and development (R&D)	**3.6**	**83**
2.3.1 Researchers, FTE/mn pop.	752.8	61
2.3.2 Gross expenditure on R&D, % GDP	0.4	67
2.3.3 Global corporate R&D investors, top 3, mn US$	0.0	40 ○ ◇
2.3.4 QS university ranking, top 3*	0.0	71 ○ ◇
Infrastructure	**53.3**	**40**
3.1 Information and communication technologies (ICTs)	**69.6**	**69**
3.1.1 ICT access*	72.7	85
3.1.2 ICT use*	70.1	71
3.1.3 Government's online service*	67.1	65
3.1.4 E-participation*	68.6	43
3.2 General infrastructure	**29.5**	**57**
3.2.1 Electricity output, GWh/mn pop.	2,663.4	70
3.2.2 Logistics performance*	45.5	56
3.2.3 Gross capital formation, % GDP	n/a	n/a
3.3 Ecological sustainability	**60.7**	**3**
3.3.1 GDP/unit of energy use	11.6	52
3.3.2 Environmental performance*	60.0	32 ●
3.3.3 ISO 14001 environment/bn PPP$ GDP	12.0	3 ●
Market sophistication	**47.1**	**30**
4.1 Credit	**34.1**	**54**
4.1.1 Finance for startups and scaleups†	48.4	49
4.1.2 Domestic credit to private sector, % GDP	55.7	65
4.1.3 Loans from microfinance institutions, % GDP	n/a	n/a
4.2 Investment	**n/a**	**n/a**
4.2.1 Market capitalization, % GDP	n/a	n/a
4.2.2 Venture capital (VC) investors, deals/bn PPP$ GDP	n/a	n/a
4.2.3 VC recipients, deals/bn PPP$ GDP	n/a	n/a
4.2.4 VC received, value, % GDP	n/a	n/a
4.3 Trade, diversification, and market scale	**60.1**	**54**
4.3.1 Applied tariff rate, weighted avg., %	1.7	55
4.3.2 Domestic industry diversification	90.8	44
4.3.3 Domestic market scale, bn PPP$	40.9	117 ○

	Score / Value	Rank
Business sophistication	**29.2**	**60**
5.1 Knowledge workers	**36.3**	**57**
5.1.1 Knowledge-intensive employment, %	33.2	44
5.1.2 Firms offering formal training, %	39.0	36
5.1.3 GERD performed by business, % GDP	0.1	62
5.1.4 GERD financed by business, %	22.3	64
5.1.5 Females employed w/advanced degrees, %	17.0	43
5.2 Innovation linkages	**13.4**	**106**
5.2.1 University-industry R&D collaboration†	23.2	110 ○ ◇
5.2.2 State of cluster development†	27.1	100
5.2.3 GERD financed by abroad, % GDP	0.0	61
5.2.4 Joint venture/strategic alliance deals/bn PPP$ GDP	n/a	n/a
5.2.5 Patent families/bn PPP$ GDP	0.0	95 ○ ◇
5.3 Knowledge absorption	**37.9**	**51**
5.3.1 Intellectual property payments, % total trade	1.9	15 ●
5.3.2 High-tech imports, % total trade	6.6	93
5.3.3 ICT services imports, % total trade	1.3	66
5.3.4 FDI net inflows, % GDP	3.2	44
5.3.5 Research talent, % in businesses	27.9	45
Knowledge and technology outputs	**26.6**	**53**
6.1 Knowledge creation	**12.6**	**71**
6.1.1 Patents by origin/bn PPP$ GDP	1.3	52
6.1.2 PCT patents by origin/bn PPP$ GDP	0.1	60
6.1.3 Utility models by origin/bn PPP$ GDP	n/a	n/a
6.1.4 Scientific and technical articles/bn PPP$ GDP	n/a	n/a
6.1.5 Citable documents H-index	6.7	91
6.2 Knowledge impact	**32.4**	**47**
6.2.1 Labor productivity growth, %	1.3	57
6.2.2 Unicorn valuation, % GDP	0.0	48 ○ ◇
6.2.3 Software spending, % GDP	0.1	87
6.2.4 High-tech manufacturing, %	49.8	11 ●
6.3 Knowledge diffusion	**34.9**	**42**
6.3.1 Intellectual property receipts, % total trade	0.1	48
6.3.2 Production and export complexity	54.1	57
6.3.3 High-tech exports, % total trade	2.7	50
6.3.4 ICT services exports, % total trade	3.8	29 ●
6.3.5 ISO 9001 quality/bn PPP$ GDP	19.9	13 ●
Creative outputs	**23.5**	**69**
7.1 Intangible assets	**27.0**	**76**
7.1.1 Intangible asset intensity, top 15, %	-26.7	75 ○
7.1.2 Trademarks by origin/bn PPP$ GDP	57.4	40 ●
7.1.3 Global brand value, top 5,000	0.0	74 ○ ◇
7.1.4 Industrial designs by origin/bn PPP$ GDP	1.8	44
7.2 Creative goods and services	**17.1**	**55**
7.2.1 Cultural and creative services exports, % total trade	1.1	26 ●
7.2.2 National feature films/mn pop. 15-69	4.5	25 ●
7.2.3 Entertainment and media market/th pop. 15-69	n/a	n/a
7.2.4 Creative goods exports, % total trade	0.1	98
7.3 Online creativity	**23.0**	**58**
7.3.1 Generic top-level domains (TLDs)/th pop. 15-69	7.7	49
7.3.2 Country-code TLDs/th pop. 15-69	5.7	55
7.3.3 GitHub commits/mn pop. 15-69	9.1	55
7.3.4 Mobile app creation/bn PPP$ GDP	69.5	56

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 North Macedonia.

> North Macedonia has missing data for eleven indicators and outdated data for seven indicators.

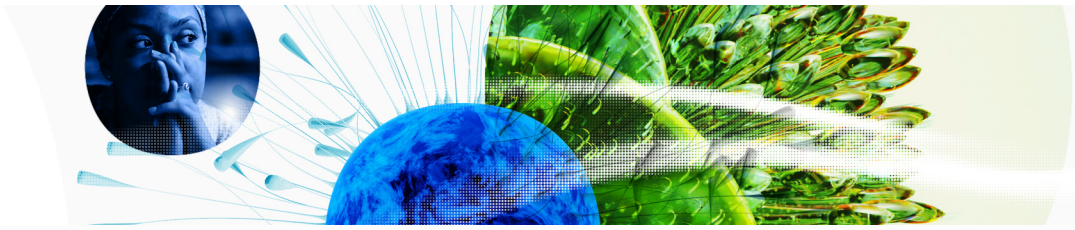
> Missing data for North Macedonia

Code	Indicator name	Economy Year	Model Year	Source
2.1.1	Expenditure on education, % GDP	n/a	2021	UNESCO Institute for Statistics
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	2019	UNESCO Institute for Statistics
3.2.3	Gross capital formation, % GDP	n/a	2022	International Monetary Fund
4.1.3	Loans from microfinance institutions, % GDP	n/a	2021	International Monetary Fund, Financial Access Survey (FAS)
4.2.1	Market capitalization, % GDP	n/a	2020	World Federation of Exchanges; World Bank
4.2.2	Venture capital (VC) investors, deals/bn PPP$ GDP	n/a	2022	Refinitiv; International Monetary Fund
4.2.3	VC recipients, deals/bn PPP$ GDP	n/a	2022	Refinitiv; International Monetary Fund
4.2.4	VC received, value, % GDP	n/a	2022	Refinitiv; International Monetary Fund
5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP	n/a	2022	Refinitiv; International Monetary Fund
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	2021	World Intellectual Property Organization; International Monetary Fund
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 North Macedonia

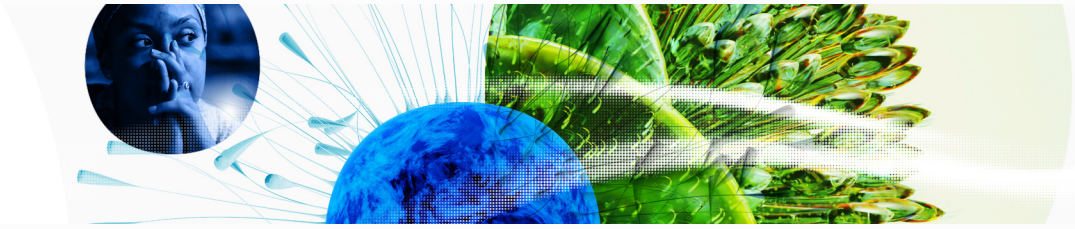
Code	Indicator name	Economy Year	Model Year	Source
1.3.2	Entrepreneurship policies and culture	2019	2022	Global Entrepreneurship Monitor
4.1.1	Finance for startups and scaleups	2019	2022	Global Entrepreneurship Monitor
4.3.2	Domestic industry diversification	2019	2020	United Nations Industrial Development Organization
5.1.3	GERD performed by business, % GDP	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT

Global Innovation Index 2023



Code	Indicator name	Economy Year	Model Year	Source
5.3.5	Research talent, % in businesses	2020	2021	UNESCO Institute for Statistics; Eurostat; OECD; RICYT
6.2.1	Labor productivity growth, %	2020	2022	The Conference Board
6.2.4	High-tech manufacturing, %	2019	2020	United Nations Industrial Development Organization

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.