Global Innovation Index 2022

NORTH MACEDONIA

66th North Macedonia ranks 66th among the 132 economies featured in the GII 2022.

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 North Macedonia 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 North Macedonia in the GII 2022 is between ranks 64 and 75.

Rankings for North Macedonia (2020–2022)

GIIYR	GII	Innovation inputs	Innovation outputs
2020	57	46	63
2021	59	40	69
2022	66	60	77

- North Macedonia performs better in innovation inputs than innovation outputs in 2022.
- This year North Macedonia ranks 60th in innovation inputs, lower than both 2021 and 2020.
- As for innovation outputs, North Macedonia ranks 77th. This position is lower than both 2021 and 2020.

17th North Macedonia ranks 17th among the 36 upper-middle-income group economies.

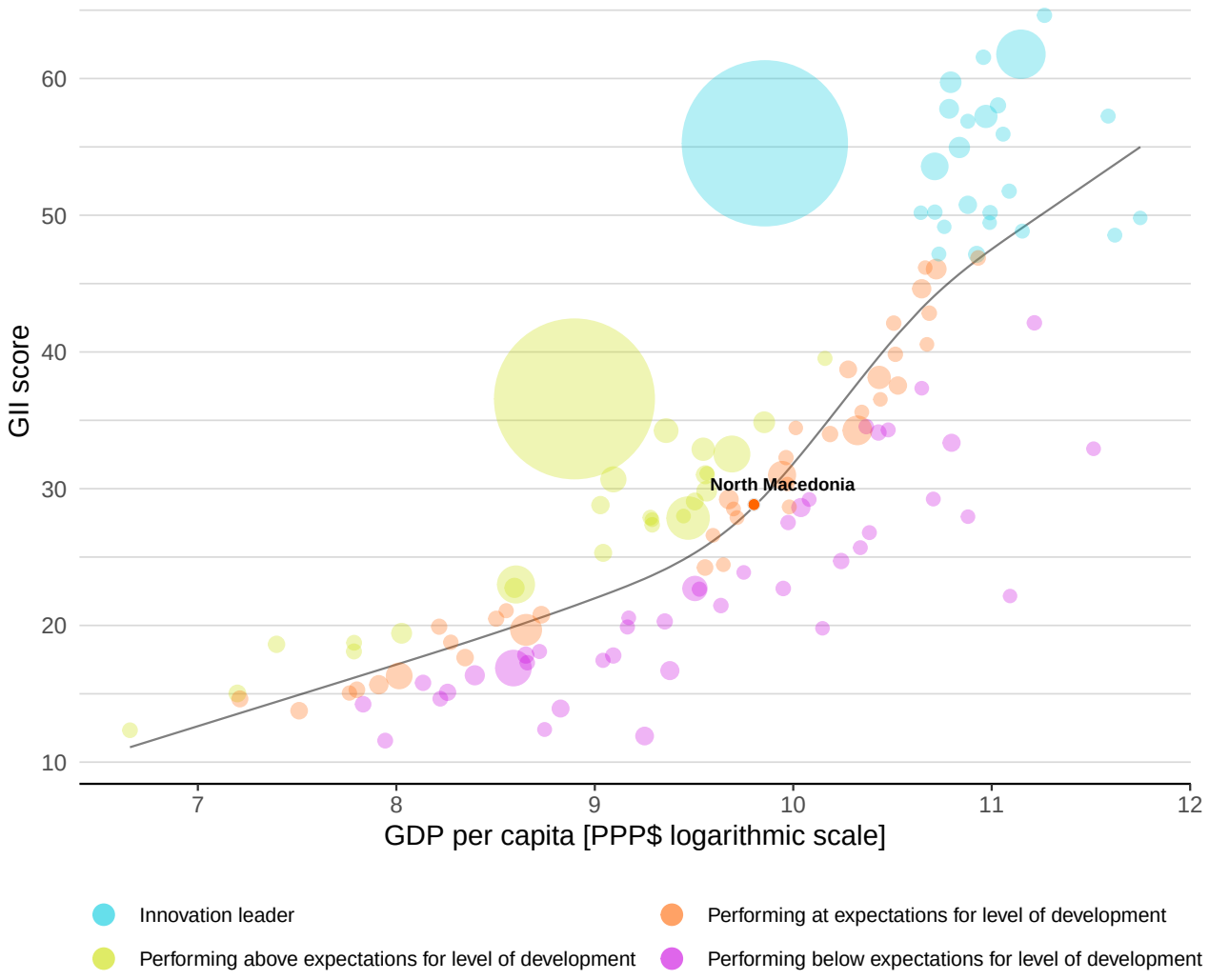
36th North Macedonia ranks 36th among the 39 economies in Europe.

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, North Macedonia's performance is at expectations for its level of development.

The positive relationship between innovation and development

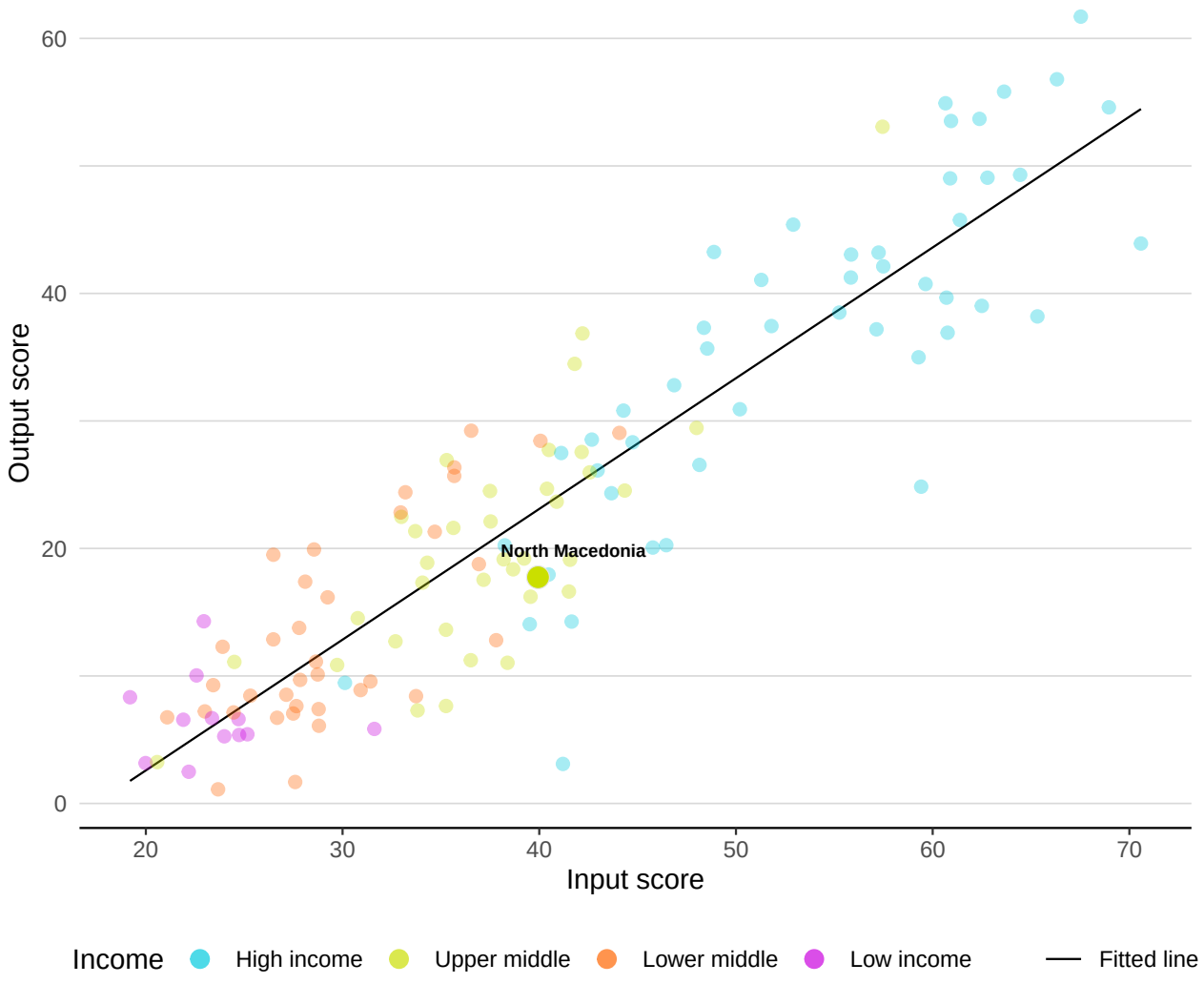


EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

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.

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

Innovation input to output performance



BENCHMARKING AGAINST OTHER UPPER MIDDLE-INCOME GROUP ECONOMIES AND EUROPE

The seven GII pillar scores for North Macedonia

Upper-middle-income group economies

North Macedonia performs above the upper-middle-income group average in four pillars, namely: Infrastructure; Market sophistication; Business sophistication; and, Knowledge and technology outputs.

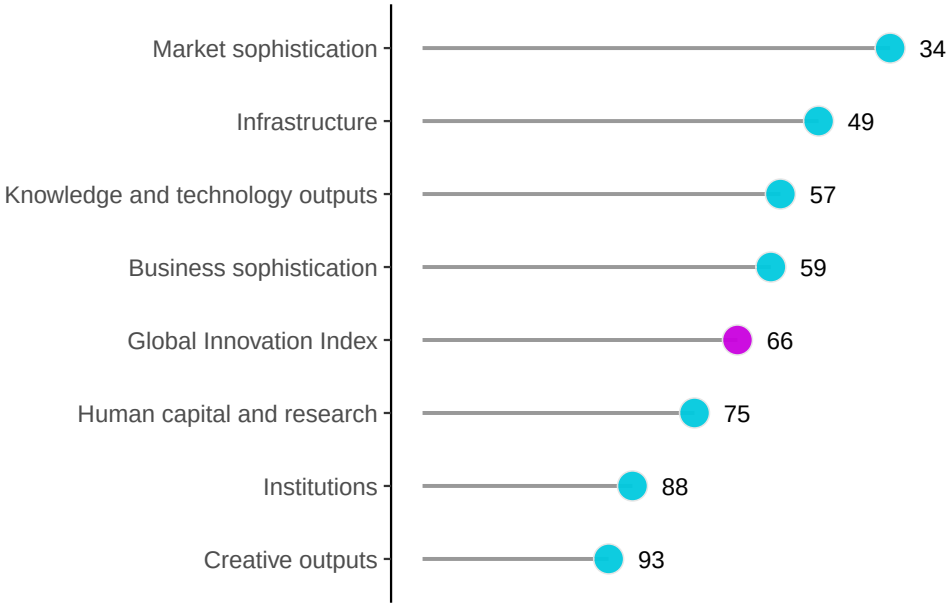
Europe

North Macedonia performs above the regional average in Market sophistication.

OVERVIEW OF RANKINGS IN THE SEVEN GII 2022 AREAS

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

The seven GII pillar ranks for North Macedonia



Note: The highest possible ranking in each pillar is 1.

The full WIPO Intellectual Property Statistics profile for North Macedonia can be found at:

https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=MK.

INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of the indicator strengths and weaknesses of North Macedonia in the GII 2022.

Strengths and weaknesses for North Macedonia

Strengths			Weaknesses		
Code	**Indicator name**	**Rank**	**Code**	**Indicator name**	**Rank**
2.1.5	Pupil-teacher ratio, secondary	13	1.3.1	Policies for doing business	112
3.1.4	E-participation	38	1.3.2	Entrepreneurship policies and culture	71
3.3.2	Environmental performance	32	2.1.4	PISA scales in reading, maths and science	67
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	5	2.3.3	Global corporate R&D investors, top 3, mn USD	38
5.3.1	Intellectual property payments, % total trade	13	2.3.4	QS university ranking, top 3	72
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	16	4.3.3	Domestic market scale, bn PPP$	116
6.2.5	High-tech manufacturing, %	16	5.2.1	University-industry R&D collaboration	106
6.3.4	ICT services exports, % total trade	33	5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP	111
7.2.1	Cultural and creative services exports, % total trade	31	7.1.1	Intangible asset intensity, top 15, %	76
7.2.4	Printing and other media, % manufacturing	13	7.1.3	Global brand value, top 5,000, % GDP	77

GII 2022 rank

North Macedonia

66

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
77	60	Upper middle	EUR	2.1	37.4	18,069

		Score/ Value	Rank
Institutions		**50.3**	**88**
1.1	**Political environment**	**63.6**	**53**
1.1.1	Political and operational stability*	74.5	42
1.1.2	Government effectiveness*	52.7	62
1.2	**Regulatory environment**	**69.1**	**53**
1.2.1	Regulatory quality*	57.6	47
1.2.2	Rule of law*	44.4	64
1.2.3	Cost of redundancy dismissal	14.4	57
1.3	**Business environment**	**18.3**	**126 ○ ◇**
1.3.1	Policies for doing business†	32.6	112 ○
1.3.2	Entrepreneurship policies and culture* ◷	4.0	71 ○ ◇
Human capital and research		**28.4**	**75**
2.1	**Education**	**56.6**	**[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 ◷	13.5	77
2.1.4	PISA scales in reading, maths and science	400.1	67 ○
2.1.5	Pupil-teacher ratio, secondary ◷	8.3	13 ● ◆
2.2	**Tertiary education**	**26.1**	**77**
2.2.1	Tertiary enrolment, % gross ◷	43.1	72
2.2.2	Graduates in science and engineering, %	20.6	62
2.2.3	Tertiary inbound mobility, % ◷	5.2	49
2.3	**Research and development (R&D)**	**2.6**	**81**
2.3.1	Researchers, FTE/mn pop.	786.8	58
2.3.2	Gross expenditure on R&D, % GDP	0.4	70
2.3.3	Global corporate R&D investors, top 3, mn USD	0.0	38 ○ ◇
2.3.4	QS university ranking, top 3*	0.0	72 ○ ◇
Infrastructure		**49.2**	**49**
3.1	**Information and communication technologies (ICTs)**	**75.4**	**61**
3.1.1	ICT access*	81.5	80
3.1.2	ICT use*	62.5	65
3.1.3	Government's online service*	74.1	58
3.1.4	E-participation*	83.3	38 ●
3.2	**General infrastructure**	**21.4**	**100**
3.2.1	Electricity output, GWh/mn pop.	2,572.1	70
3.2.2	Logistics performance*	30.2	79
3.2.3	Gross capital formation, % GDP	n/a	n/a
3.3	**Ecological sustainability**	**50.9**	**8 ● ◆**
3.3.1	GDP/unit of energy use	11.4	56
3.3.2	Environmental performance*	54.3	32 ● ◆
3.3.3	ISO 14001 environmental certificates/bn PPP$ GDP	11.0	5 ● ◆
Market sophistication		**42.6**	**34 ● ◆**
4.1	**Credit**	**25.3**	**71**
4.1.1	Finance for startups and scaleups* ◷	30.6	56
4.1.2	Domestic credit to private sector, % GDP	56.2	62
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 investors, deals/bn PPP$ GDP	n/a	n/a
4.2.3	Venture capital recipients, deals/bn PPP$ GDP	n/a	n/a
4.2.4	Venture capital received, value, % GDP	n/a	n/a
4.3	**Trade, diversification, and market scale**	**59.9**	**52**
4.3.1	Applied tariff rate, weighted avg., %	1.7	55
4.3.2	Domestic industry diversification ◷	90.3	44
4.3.3	Domestic market scale, bn PPP$	37.4	116 ○

		Score/ Value	Rank
Business sophistication		**29.1**	**59**
5.1	**Knowledge workers**	**35.1**	**57**
5.1.1	Knowledge-intensive employment, %	31.2	49
5.1.2	Firms offering formal training, %	39.0	35
5.1.3	GERD performed by business, % GDP	0.1	62
5.1.4	GERD financed by business, %	23.6	64
5.1.5	Females employed w/advanced degrees, %	15.8	46
5.2	**Innovation linkages**	**17.1**	**113 ○**
5.2.1	University-industry R&D collaboration†	33.7	106 ○
5.2.2	State of cluster development and depth†	41.7	98
5.2.3	GERD financed by abroad, % GDP	0.0	61
5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP ◷	0.0	111 ○
5.2.5	Patent families/bn PPP$ GDP	0.1	52
5.3	**Knowledge absorption**	**35.0**	**50**
5.3.1	Intellectual property payments, % total trade	2.1	13 ● ◆
5.3.2	High-tech imports, % total trade	6.6	98
5.3.3	ICT services imports, % total trade	1.2	78
5.3.4	FDI net inflows, % GDP	3.2	41
5.3.5	Research talent, % in businesses	27.9	43
Knowledge and technology outputs		**24.5**	**57**
6.1	**Knowledge creation**	**9.8**	**76**
6.1.1	Patents by origin/bn PPP$ GDP	1.4	55
6.1.2	PCT patents by origin/bn PPP$ GDP	0.2	56
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	n/a
6.1.4	Scientific and technical articles/bn PPP$ GDP	13.9	70
6.1.5	Citable documents H-index	6.2	90
6.2	**Knowledge impact**	**36.8**	**33 ●**
6.2.1	Labor productivity growth, %	0.1	86
6.2.2	New businesses/th pop. 15–64	3.5	40
6.2.3	Software spending, % GDP	0.1	78
6.2.4	ISO 9001 quality certificates/bn PPP$ GDP	18.2	16 ● ◆
6.2.5	High-tech manufacturing, % ◷	47.0	16 ● ◆
6.3	**Knowledge diffusion**	**27.0**	**54**
6.3.1	Intellectual property receipts, % total trade	0.1	48
6.3.2	Production and export complexity	42.6	57
6.3.3	High-tech exports, % total trade	2.9	49
6.3.4	ICT services exports, % total trade	3.5	33 ●
Creative outputs		**10.9**	**93**
7.1	**Intangible assets**	**7.2**	**108 ◇**
7.1.1	Intangible asset intensity, top 15, %	−22.8	76 ○ ◇
7.1.2	Trademarks by origin/bn PPP$ GDP	n/a	n/a
7.1.3	Global brand value, top 5,000, % GDP	0.0	77 ○ ◇
7.1.4	Industrial designs by origin/bn PPP$ GDP	1.2	64
7.2	**Creative goods and services**	**23.1**	**52**
7.2.1	Cultural and creative services exports, % total trade	1.0	31 ●
7.2.2	National feature films/mn pop. 15–69	3.8	32 ◆
7.2.3	Entertainment and media market/th pop. 15–69	n/a	n/a
7.2.4	Printing and other media, % manufacturing ◷	2.0	13 ●
7.2.5	Creative goods exports, % total trade	0.1	86
7.3	**Online creativity**	**6.3**	**56**
7.3.1	Generic top-level domains (TLDs)/th pop. 15–69	6.9	46
7.3.2	Country-code TLDs/th pop. 15–69	5.5	53
7.3.3	GitHub commit pushes received/mn pop. 15–69	6.2	51
7.3.4	Mobile app creation/bn PPP$ GDP	6.6	53

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/global_innovation_index/en/2022. 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 indicators that are either missing or outdated for North Macedonia.

Missing data for North Macedonia

Code	Indicator name	Economy year	Model year	Source
2.1.1	Expenditure on education, % GDP	n/a	2020	UNESCO Institute for Statistics
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	2018	UNESCO Institute for Statistics
3.2.3	Gross capital formation, % GDP	n/a	2021	International Monetary Fund
4.1.3	Loans from microfinance institutions, % GDP	n/a	2020	International Monetary Fund, Financial Access Survey (FAS)
4.2.1	Market capitalization, % GDP	n/a	2020	World Federation of Exchanges
4.2.2	Venture capital investors, deals/bn PPP$ GDP	n/a	2021	Refinitiv
4.2.3	Venture capital recipients, deals/bn PPP$ GDP	n/a	2021	Refinitiv
4.2.4	Venture capital received, value, % GDP	n/a	2021	Refinitiv
6.1.3	Utility models by origin/bn PPP$ GDP	n/a	2020	World Intellectual Property Organization
7.1.2	Trademarks by origin/bn PPP$ GDP	n/a	2020	World Intellectual Property Organization
7.2.3	Entertainment and media market/th pop. 15–69	n/a	2021	PwC, GEMO

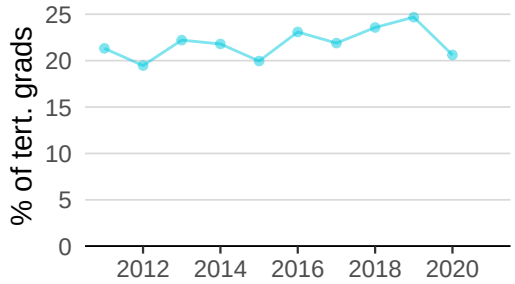
Outdated data for North Macedonia

Code	Indicator name	Economy year	Model year	Source
1.3.2	Entrepreneurship policies and culture	2019	2021	Global Entrepreneurship Monitor
2.1.3	School life expectancy, years	2018	2019	UNESCO Institute for Statistics
2.1.5	Pupil-teacher ratio, secondary	2018	2019	UNESCO Institute for Statistics
2.2.1	Tertiary enrolment, % gross	2018	2019	UNESCO Institute for Statistics
2.2.3	Tertiary inbound mobility, %	2018	2019	UNESCO Institute for Statistics
4.1.1	Finance for startups and scaleups	2019	2021	Global Entrepreneurship Monitor
4.3.2	Domestic industry diversification	2018	2019	United Nations Industrial Development Organization
5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP	2019	2021	Refinitiv
6.2.5	High-tech manufacturing, %	2018	2019	United Nations Industrial Development Organization
7.2.4	Printing and other media, % manufacturing	2018	2019	United Nations Industrial Development Organization

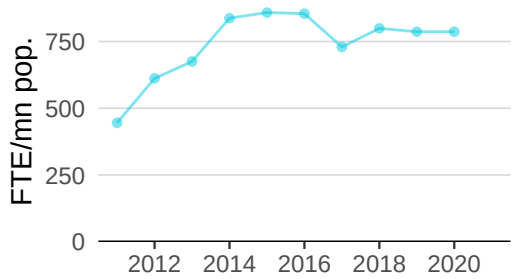
NORTH MACEDONIA'S INNOVATION SYSTEM

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

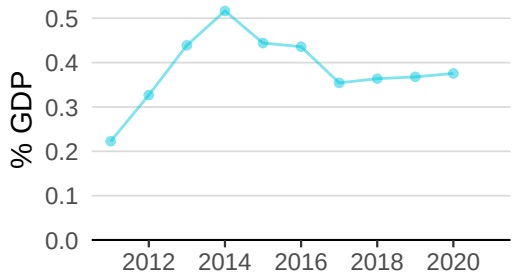
Innovation inputs



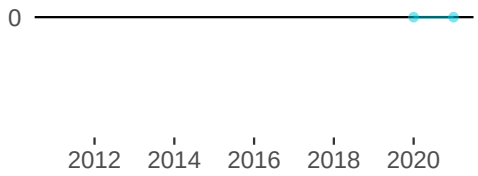
2.2.2 Graduates in science and engineering was equal to 20.6% of tert. grads in 2020–down by 16 percentage points from the year prior–and equivalent to an indicator rank of 62.



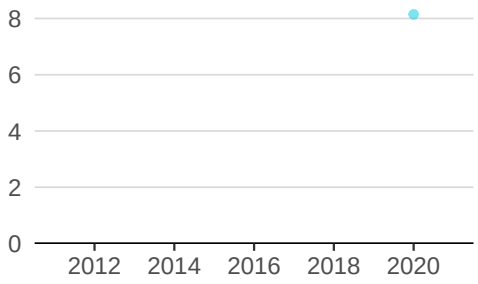
2.3.1 Researchers was equal to 786.8 FTE/mn pop. in 2020–effectively unchanged from the year prior–and equivalent to an indicator rank of 58.



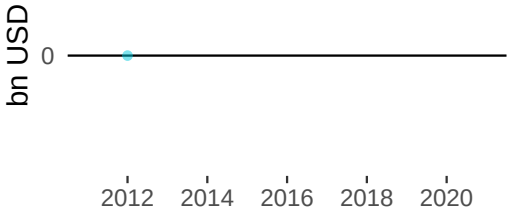
2.3.2 Gross expenditure on R&D was equal to 0.4% GDP in 2020–up by 2 percentage points from the year prior–and equivalent to an indicator rank of 70.



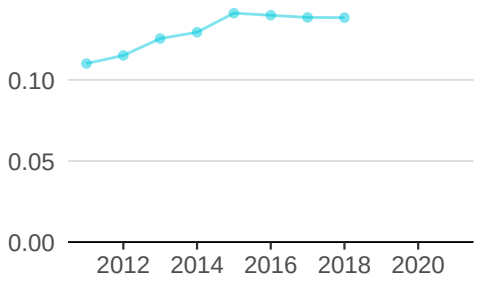
2.3.4 QS university ranking was equal to 0.0 in 2021–effectively unchanged from the year prior–and equivalent to an indicator rank of 72.



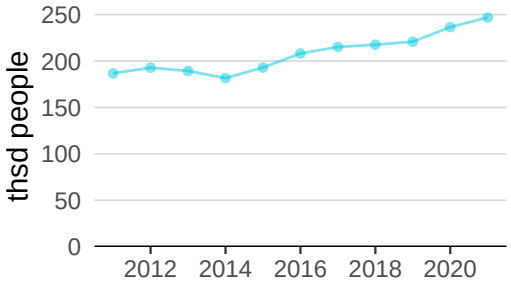
3.1.1 ICT access was equal to 8.1 in 2020 and equivalent to an indicator rank of 80.



4.2.4 Venture capital received was equal to 0.0 bn USD in 2012 .

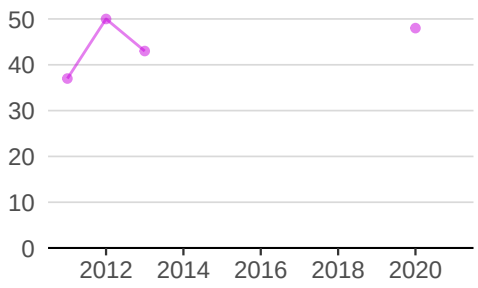


4.3.2 Domestic industry diversification was equal to 0.1 in 2018–effectively unchanged from the year prior–and equivalent to an indicator rank of 44.

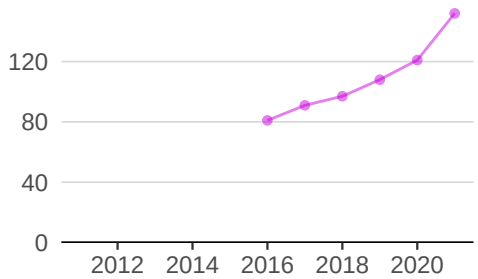


5.1.1 Knowledge-intensive employment was equal to 246.8 thsd people in 2021–up by 4 percentage points from the year prior–and equivalent to an indicator rank of 49.

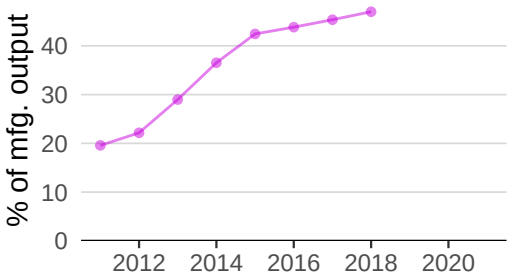
Innovation outputs



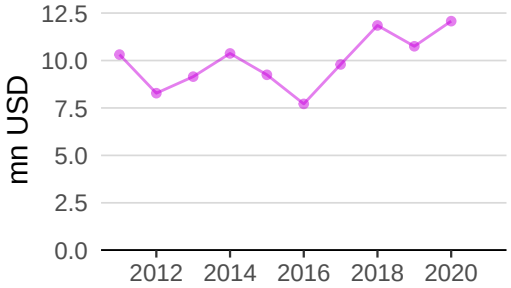
6.1.1 Patents by origin was equal to 48.0 in 2020 and equivalent to an indicator rank of 55.



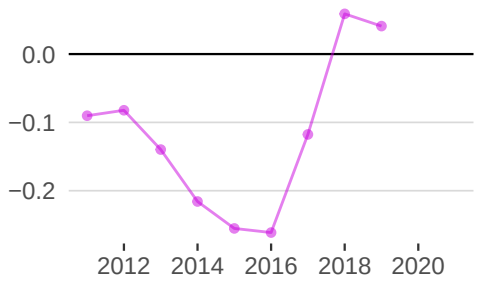
6.1.5 Citable documents H-index was equal to 152.0 in 2021–up by 26 percentage points from the year prior–and equivalent to an indicator rank of 90.



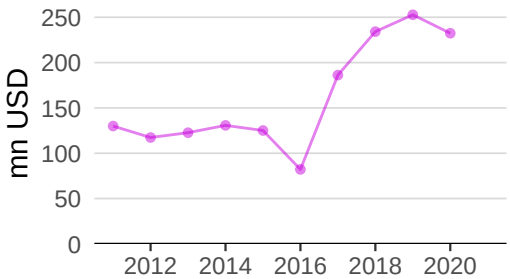
6.2.5 High-tech manufacturing was equal to 47.0% of mfg. output in 2018–up by 4 percentage points from the year prior–and equivalent to an indicator rank of 16.



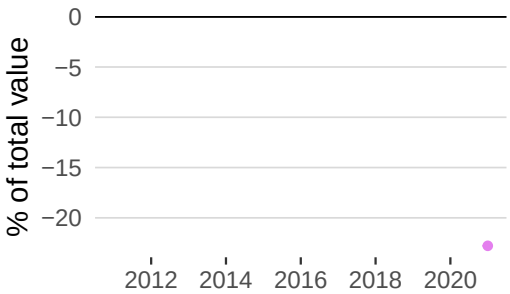
6.3.1 Intellectual property receipts was equal to 12.1 mn USD in 2020–up by 12 percentage points from the year prior–and equivalent to an indicator rank of 48.



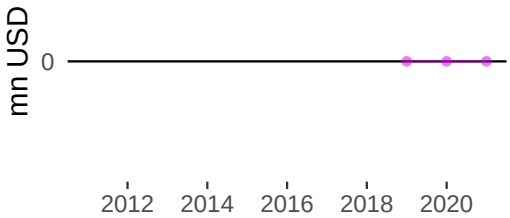
6.3.2 Production and export complexity was equal to 0.0 in 2019–down by 30 percentage points from the year prior–and equivalent to an indicator rank of 57.



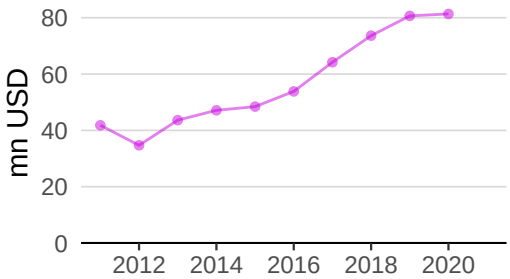
6.3.3 High-tech exports was equal to 232.4 mn USD in 2020–down by 8 percentage points from the year prior–and equivalent to an indicator rank of 49.



7.1.1 Intangible asset intensity was equal to -22.8% of total value in 2021 and equivalent to an indicator rank of 76.



7.1.3 Global brand value was equal to 0.0 mn USD in 2021–effectively unchanged from the year prior–and equivalent to an indicator rank of 77.



7.2.1 Cultural and creative services exports was equal to 81.3 mn USD in 2020–up by 1 percentage point from the year prior–and equivalent to an indicator rank of 31.

NORTH MACEDONIA'S INNOVATION TOP PERFORMERS

2.3.3 Global corporate R&D investors

Firm	Industry	R&D	R&D Growth	R&D Intensity	Rank

No observations

Source: European Commission's Joint Research Centre (https://iri.jrc.ec.europa.eu/scoreboard/2021-eu-industrial-rd-investment-scoreboard).

2.3.4 QS university ranking

University	Score	Rank

No observations

Source: QS Quacquarelli Symonds Ltd (https://www.topuniversities.com/university-rankings/world-university-rankings/2022).

7.1.1 Intangible asset intensity, top 15

Firm	Rank
MERMEREN KOMBINAT	1
MAKEDONSKI TELEKOM	2
ALKALOID	3

Source: Brand Finance (https://brandirectory.com/reports/gift-2021).
Note: Brand Finance only provides within economy ranks.

7.1.3 Global brand value, top 5,000

Brand	Industry	Rank

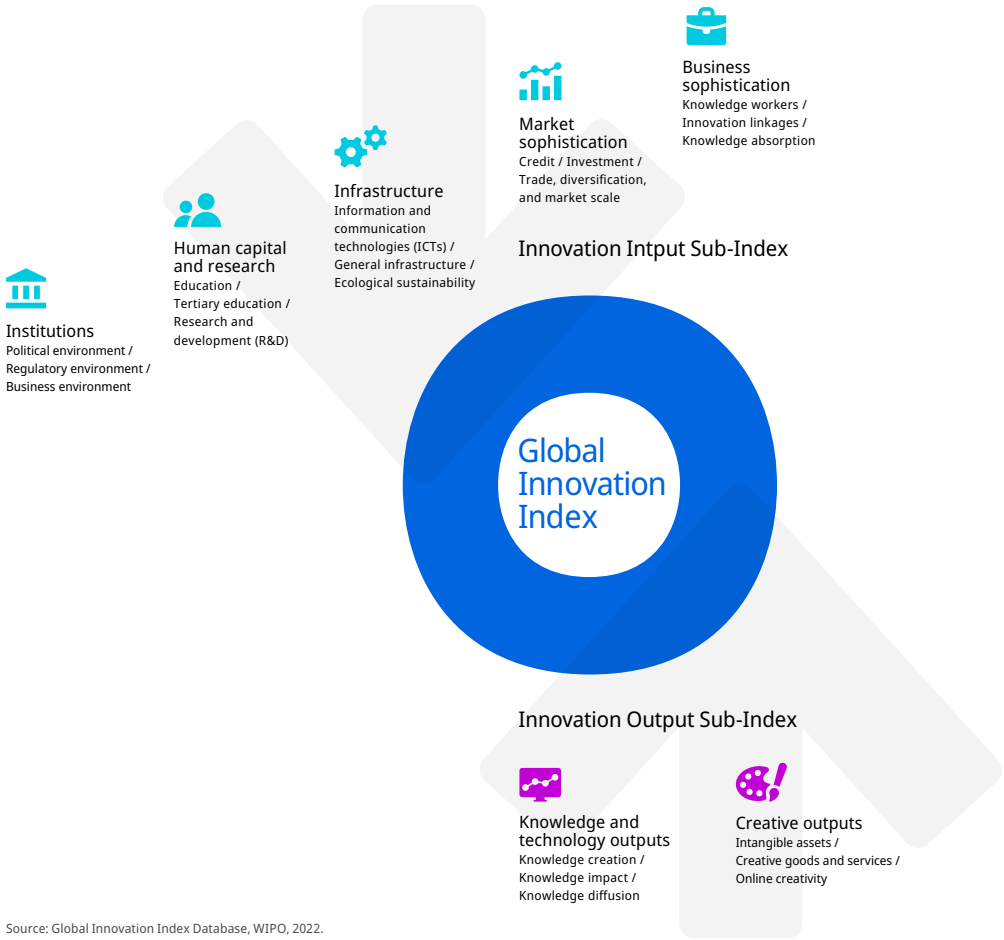
No observations

Source: Brand Finance (https://brandirectory.com).

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, 2022.

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.