The Global Innovation Index (GII) is a ranking of world economies based on 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 the GII model influence year-on-year comparisons of the GII ranks. The confidence interval for North Macedonia’s ranking in the GII 2019 is between 58 and 65.

<table>
<thead>
<tr>
<th></th>
<th>GII</th>
<th>Innovation Inputs</th>
<th>Innovation Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>59</td>
<td>52</td>
<td>63</td>
</tr>
<tr>
<td>2018</td>
<td>84</td>
<td>71</td>
<td>93</td>
</tr>
<tr>
<td>2017</td>
<td>61</td>
<td>53</td>
<td>63</td>
</tr>
</tbody>
</table>

- North Macedonia performs better in Innovation Inputs than Outputs.
- This year North Macedonia ranks 52nd in Innovation Inputs, better than 2018 and compared to 2017.
- As for Innovation Outputs, North Macedonia ranks 63rd. This position is better than 2018 and the same as 2017.

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 considered Innovation under-performers relative to GDP.

Relative to GDP, North Macedonia performs above its expected level of development.

GII scores and GDP per capita in PPP US$ (bubbles sized by population)
EFFECTIVELY TRANSLATING INNOVATION INVESTMENTS INTO INNOVATION OUTPUTS

The chart below shows the relationship between innovation inputs and innovation outputs, indicating which economies best translate innovation inputs into innovation outputs. Economies appearing above the line are effectively translating their costly innovation investments into more and higher-quality outputs. In contrast, those below the line are not effectively translating innovation inputs into outputs.

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

Innovation input/output performance by income group, 2019
**BENCHMARKING NORTH MACEDONIA TO OTHER UPPER MIDDLE-INCOME ECONOMIES AND THE EUROPE REGION**

**North Macedonia’s scores in the seven GII pillars**

![Diagram showing North Macedonia's scores in the seven GII pillars]

### Upper middle-income economies

North Macedonia has high scores in 5 out of the 7 GII pillars: Institutions, Infrastructure, Market sophistication, Knowledge & technology outputs, and Creative outputs, which are above the average of the upper middle-income group.

### Europe Region

Compared to other economies in Europe, North Macedonia performs above average in 1 out of the 7 GII pillars: Market sophistication.

Top ranks are found in Business environment, Ecological sustainability, Investment, Knowledge workers, and Online creativity where the country ranks in the top 50 worldwide.
OVERVIEW OF NORTH MACEDONIA’S RANKINGS IN THE 7 GII AREAS

North Macedonia performs the best in Market sophistication and its weakest performance is in Human capital & research.

NORTH MACEDONIA’S INNOVATION STRENGTHS AND WEAKNESSES

The table below gives an overview of North Macedonia’s strengths and weaknesses in the GII 2019.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business environment</td>
<td>27</td>
</tr>
<tr>
<td>Ease of resolving insolvency*</td>
<td>28</td>
</tr>
<tr>
<td>Pupil-teacher ratio, secondary</td>
<td>22</td>
</tr>
<tr>
<td>ISO 14001 environmental certificates/bn PPP$ GDP</td>
<td>12</td>
</tr>
<tr>
<td>Market sophistication</td>
<td>28</td>
</tr>
<tr>
<td>Ease of getting credit*</td>
<td>11</td>
</tr>
<tr>
<td>Ease of protecting minority investors*</td>
<td>6</td>
</tr>
<tr>
<td>Firms offering formal training, % firms</td>
<td>25</td>
</tr>
<tr>
<td>ISO 9001 quality certificates/bn PPP$ GDP</td>
<td>24</td>
</tr>
<tr>
<td>High- &amp; medium-high-tech manufactures, %</td>
<td>20</td>
</tr>
<tr>
<td>Printing &amp; other media, % manufacturing</td>
<td>18</td>
</tr>
<tr>
<td>Wikipedia edits/mn pop. 15–69</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weaknesses</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>PISA scales in reading, maths &amp; science</td>
<td>68</td>
</tr>
<tr>
<td>Global R&amp;D companies, top 3, in mn US$</td>
<td>43</td>
</tr>
<tr>
<td>QS university ranking, average score top 3*</td>
<td>78</td>
</tr>
<tr>
<td>General infrastructure</td>
<td>120</td>
</tr>
<tr>
<td>Domestic market scale, bn PPP$</td>
<td>112</td>
</tr>
<tr>
<td>Innovation linkages</td>
<td>107</td>
</tr>
<tr>
<td>University/industry research collaboration†</td>
<td>108</td>
</tr>
<tr>
<td>Patent families 2+ offices/bn PPP$ GDP</td>
<td>93</td>
</tr>
<tr>
<td>High-tech imports, % total trade</td>
<td>102</td>
</tr>
<tr>
<td>Growth rate of PPP$ GDP/worker, %, 3-year average</td>
<td>90</td>
</tr>
<tr>
<td>ICTs &amp; business model creation†</td>
<td>112</td>
</tr>
<tr>
<td>ICTs &amp; organizational model creation†</td>
<td>111</td>
</tr>
</tbody>
</table>
**STRENGTHS**

- **GII** strengths for North Macedonia are found in all of the seven GII pillars.
- **Pillar Market sophistication** (28) is a notable strength for the country. Here additional strengths are indicators Ease of getting credit (11) and Ease of protecting minority investors (6).
- In **Institutions** (43), North Macedonia’s strengths are sub-pillar Business environment (27) as well as one of its indicators - Ease of resolving insolvency (28).
- In **Human capital & research** (80), indicator Pupil-teacher ratio (22) is a relative strength for the country.
- In **Infrastructure** (71), one relative strength is found in indicator ISO 14001 environmental certificates (12).
- In **Business sophistication** (66), indicator Firms offering formal training (25) is a GII strength for North Macedonia.
- In **Knowledge & technology outputs** (66), North Macedonia’s strengths are indicators ISO 9001 quality certificates (24) and High- & medium-high-tech manufactures (20).
- In **Creative outputs** (62), GII strengths for the country are indicators Printing & other media (18) and Wikipedia edits (29).

**WEAKNESSES**

- North Macedonia’s weaknesses in the GII are found in six of the seven GII pillars.
- In **Human capital & research** (80), North Macedonia’s weaknesses are indicators PISA results (68), Global R&D companies (43), and Quality of universities (78).
- Sub-pillar **General infrastructure** (120) is a relative weakness in Infrastructure (71).
- In **Business sophistication** (66), GII weaknesses are sub-pillar Innovation linkages (107) and indicators University-industry research collaboration (108), Patent families in two or more offices (93), and High-tech imports (102).
- In **Creative outputs** (62), two indicators – ICTs & business model creation (112) and ICTs & organizational model creation (111) – are relative weaknesses for North Macedonia.
- Other relative weaknesses for this economy are indicators Domestic market scale (112) in **Market sophistication** (28) and Labor productivity growth (90) in **Knowledge & technology outputs** (66).
NORTH MACEDONIA

GII 2019 rank

59

[Table 1: Ranks and scores for various indicators]

Output rank | Input rank | Income | Region | Population (mn) | GDP, PPP$ | GDP per capita, PPP$ | GII 2018 rank |
---|---|---|---|---|---|---|---|
63 | 52 | Upper middle | EUR | 2.1 | 32.3 | 15,709.5 | 84 |

[Table 2: Key indicators]

**HUMAN CAPITAL AND RESEARCH** 26.4 80

2.1 Education................................................ 48.7 [65]
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, 5 13.3 79
2.1.4 R&D performers in reading, maths, science.. 268.9 68 O
2.1.5 Pupil-teacher ratio, secondary, O 9.4 22 O

2.2 Tertiary education.................................... 26.5 77
2.2.1 Tertiary enrolment, % gross, 41.1 69
2.2.2 Graduates in science & engineering, %, 20.0 66
2.2.3 Tertiary inbound mobility, 3.5 58

2.3 Research & development (R&D)................. 4.0 80
2.3.1 Researchers, FTE/mn pop.. 729.2 55
2.3.2 Gross expenditure on R&D, % GDP.. 0.4 72
2.3.3 Global R&D companies, avg. exp. top 3, mn US$.. 0.0 43 O O
2.3.4 QS university ranking, average score top 3... 0.0 78 O O

**INFRATESTRUCTURE** 44.9 71

3.1 Information & communication technologies(ICTs) 66.6 66
3.1.1 ICT access.. 68.3 63
3.1.2 ICT use*.. 56.3 62
3.1.3 Government’s online service.. 71.5 69
3.1.4 E-participation*.. 70.2 69

3.2 General infrastructure.......................... 19.8 120 O
3.2.1 Electric output, KWh/mn pop.. 2,706 66
3.2.2 Logistics performance*.. 30.0 80
3.2.3 Gross capital formation, % GDP.. n/a n/a

3.3 Ecological sustainability.......................... 48.2 37 O
3.3.1 GDP/unit of energy use.. 10.1 49
3.3.2 Environmental performance*.. 61.1 61
3.3.3 ISO 14001 environmental certificates/bn PPP$ GDP.. 7.5 12 O

**MARKET SOPHISTICATION** 57.1 28 O

4.1 Credit.................................................. 37.6 61
4.1.1 Ease of getting credit*.. 85.0 11 O O
4.1.2 Domestic credit to private sector, % GDP, 50.0 68
4.1.3 Microfinance gross loans, % GDP, 0.3 39

4.2 Investment.............................................. 80.0 [3]
4.2.1 Ease of protecting minority investors*.. 80.0 6 O O
4.2.2 Market capitalization, % GDP, n/a n/a
4.2.3 Venture capital deals/bn PPP$ GDP, n/a n/a

4.3 Trade, competition, & market scale............. 53.8 93
4.3.1 Applied tariff rate, weighted avg., %.. 1.9 52
4.3.2 Intensity of local competition.. 62.5 95
4.3.3 Domestic market scale, bn PPP$.. 32.3 112 O O

**BUSINESS SOPHISTICATION** 30.5 66

5.1 Knowledge workers............................... 42.2 50
5.1.1 Knowledge-intensive employment, %.. 23.0 47
5.1.2 Firms offering formal training, % firms.. 46.9 25 O
5.1.3 GERD performed by business, % GDP.. 0.1 62
5.1.4 GERD financed by business, % GDP.. 27.4 63
5.1.5 Females employed w/advanced degrees, %.. 13.8 47

5.2 Innovation linkages............................... 18.0 107 O
5.2.1 University/industry research collaboration*.. 29.2 108 O
5.2.2 State of cluster development*.. 37.0 99
5.2.3 GERD financed by abroad, %.. 5.9 59
5.2.4 JV-strategic alliance deals/bn PPP$ GDP.. n/a n/a
5.2.5 Patent families 2+ offices/bn PPP$ GDP.. 0.0 93 O O

5.3 Knowledge absorption........................... 31.2 79
5.3.1 Intellectual property payments, % total trade.. 0.9 41
5.3.2 High-tech imports, % total trade.. 5.4 102 O O
5.3.3 ICT services imports, % total trade.. 1.4 52
5.3.4 FDI net inflows, % GDP.. 3.8 43
5.3.5 Research talent, % in business enterprise.. 215 55

**KNOWLEDGE & TECHNOLOGY OUTPUTS** 21.6 66

6.1 Knowledge creation............................... 8.8 74
6.1.1 Patents by origin/bn PPP$ GDP, 1.6 51
6.1.2 PCT patents by origin/bn PPP$ GDP.. 0.2 52
6.1.3 Utility models by origin/bn PPP$ GDP.. n/a n/a
6.1.4 Scientific & technical articles/bn PPP$ GDP.. 8.1 57
6.1.5 Citable documents H-index.. 4.7 96

6.2 Knowledge impact............................... 39.3 52
6.2.1 Growth rate of PPP$/GDPworker, %.. 0.0 90 O O
6.2.2 New businesses/th pop. 15-64.. 3.9 33
6.2.3 Computer software spending, % GDP.. 0.1 80
6.2.4 ISO 9001 quality certificates/bn PPP$ GDP.. 14.3 24 O
6.2.5 High- & medium-high-tech manufactures, %, O 0.4 20 O O

6.3 Knowledge diffusion............................. 16.8 71
6.3.1 Intellectual property receipts, % total trade.. 0.1 46
6.3.2 High-tech net exports, % total trade.. 1.1 67
6.3.3 ICT services exports, % total trade.. 2.5 42
6.3.4 FDI net outflows, % GDP.. 1.4 45

**CREATIVE OUTPUTS** 28.1 62

7.1 Intangible assets................................. 39.3 72
7.1.1 Trademarks by origin/bn PPP$ GDP, n/a n/a
7.1.2 Industrial designs by origin/bn PPP$ GDP.. 3.2 39
7.1.3 ICTs & business model creation*.. 48.4 112 O O
7.1.4 ICTs & organizational model creation*.. 41.1 111 O O

7.2 Creative goods & services....................... 21.0 55
7.2.1 Cultural & creative services exports, % total trade.. 0.8 35
7.2.2 National feature films/mn pop. 15-69.. 5.1 43
7.2.3 Entertainment & Media market/th pop. 15-69.. 0.7 62
7.2.4 Print & other media, % manufacturing, 2.1 18 O
7.2.5 Creative goods exports, % total trade.. 0.2 85

7.3 Online creativity.................................. 12.7 45
7.3.1 Generic top-level domains (TLDs)/th pop. 15-69.. 6.7 47
7.3.2 Country-code TLDs/th pop. 15-69.. 4.9 49
7.3.3 Wikipedia edits/mn pop. 15-69.. 47.9 21 O O
7.3.4 Mobile app creation/bn PPP$ GDP.. 7.5 44

NOTES: O indicates a strength; O a weakness; O an income group strength; O an income group weakness; * 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.
The following tables list data that are missing or are outdated for North Macedonia.

### Missing data

<table>
<thead>
<tr>
<th>Code</th>
<th>Indicator name</th>
<th>Country year</th>
<th>Model year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.1</td>
<td>Expenditure on education, % GDP</td>
<td>n/a</td>
<td>2015</td>
<td>UNESCO Institute for Statistics</td>
</tr>
<tr>
<td>2.1.2</td>
<td>Government funding/pupil, secondary, % GDP/cap</td>
<td>n/a</td>
<td>2015</td>
<td>UNESCO Institute for Statistics</td>
</tr>
<tr>
<td>3.2.3</td>
<td>Gross capital formation, % GDP</td>
<td>n/a</td>
<td>2018</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Market capitalization, % GDP</td>
<td>n/a</td>
<td>2017</td>
<td>World Federation of Exchanges</td>
</tr>
<tr>
<td>4.2.3</td>
<td>Venture capital deals/bn PPP$ GDP</td>
<td>n/a</td>
<td>2018</td>
<td>Thomson Reuters</td>
</tr>
<tr>
<td>5.2.4</td>
<td>JV–strategic alliance deals/bn PPP$ GDP</td>
<td>n/a</td>
<td>2018</td>
<td>Thomson Reuters</td>
</tr>
<tr>
<td>6.1.3</td>
<td>Utility models by origin/bn PPP$ GDP</td>
<td>n/a</td>
<td>2017</td>
<td>World Intellectual Property Organization</td>
</tr>
<tr>
<td>7.1.1</td>
<td>Trademarks by origin/bn PPP$ GDP</td>
<td>n/a</td>
<td>2017</td>
<td>World Intellectual Property Organization</td>
</tr>
<tr>
<td>7.2.3</td>
<td>Entertainment &amp; Media market/th pop. 15–69</td>
<td>n/a</td>
<td>2017</td>
<td>PwC</td>
</tr>
</tbody>
</table>

### Outdated data

<table>
<thead>
<tr>
<th>Code</th>
<th>Indicator name</th>
<th>Country year</th>
<th>Model year</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.3</td>
<td>School life expectancy, years</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics</td>
</tr>
<tr>
<td>2.1.5</td>
<td>Pupil-teacher ratio, secondary</td>
<td>2015</td>
<td>2017</td>
<td>UNESCO Institute for Statistics</td>
</tr>
<tr>
<td>2.2.1</td>
<td>Tertiary enrolment, % gross</td>
<td>2015</td>
<td>2017</td>
<td>UNESCO Institute for Statistics</td>
</tr>
<tr>
<td>2.2.2</td>
<td>Graduates in science &amp; engineering, %</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Tertiary inbound mobility, %</td>
<td>2015</td>
<td>2016</td>
<td>UNESCO Institute for Statistics</td>
</tr>
<tr>
<td>6.1.1</td>
<td>Patents by origin/bn PPP$ GDP</td>
<td>2013</td>
<td>2017</td>
<td>World Intellectual Property Organization</td>
</tr>
<tr>
<td>6.2.5</td>
<td>High- &amp; medium-high-tech manufactures, %</td>
<td>2015</td>
<td>2016</td>
<td>United Nations Industrial Development Organization</td>
</tr>
<tr>
<td>7.2.4</td>
<td>Printing &amp; other media, % manufacturing</td>
<td>2015</td>
<td>2016</td>
<td>United Nations Industrial Development Organization</td>
</tr>
<tr>
<td>7.3.3</td>
<td>Wikipedia edits/mn pop. 15–69</td>
<td>2014</td>
<td>2017</td>
<td>Wikimedia Foundation</td>
</tr>
</tbody>
</table>
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 2019, the GII presents its 12th edition devoted to the theme Creating Healthy Lives—The Future of Medical Innovation.

Recognizing that innovation is a key driver of economic development, the GII aims to provide a rich innovation ranking and 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 countries that incorporate the GII into their innovation agendas.

The GII has two sub-indices: the Innovation Input Sub-Index and the Innovation Output Sub-Index, and seven pillars, each containing three sub-pillars.