

# Global Innovation Index 2023

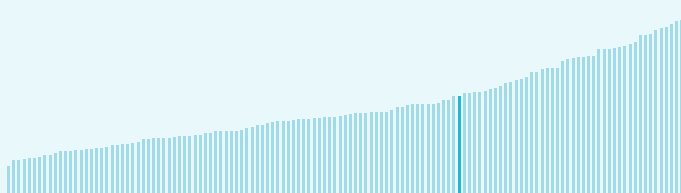


The Global Innovation Index (GII) **ranks world economies according to their innovation capabilities.**

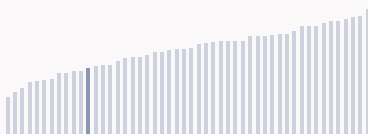
Consisting of **roughly 80 indicators**, grouped into innovation inputs and outputs, the GII **aims to capture the multi-dimensional facets of innovation.**

## Slovakia ranking in the Global Innovation Index 2023

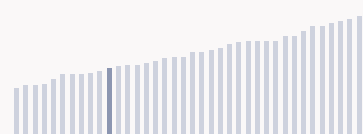
> Slovakia ranks **45th** among the 132 economies featured in the GII 2023.



> Slovakia ranks **39th** among the 50 high-income group economies.



> Slovakia ranks **29th** among the 39 economies in Europe.



### > Slovakia GII Ranking (2020-2023)

The table shows the rankings of Slovakia 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 Slovakia in the GII 2023 is between ranks 44 and 46.

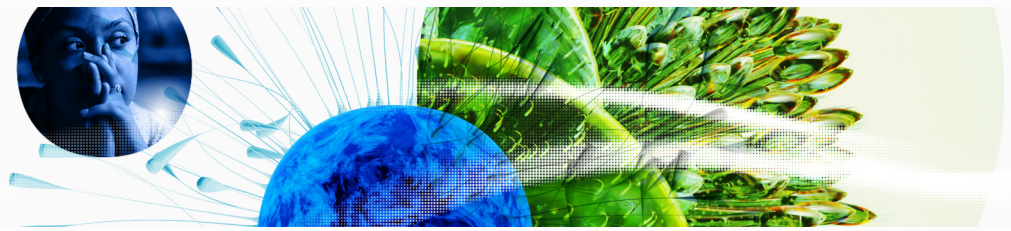
|      | GII Position | Innovation Inputs | Innovation Outputs |
|------|--------------|-------------------|--------------------|
| 2020 | 39th         | 43rd              | 34th               |
| 2021 | 37th         | 42nd              | 35th               |
| 2022 | 46th         | 54th              | 45th               |
| 2023 | 45th         | 51st              | 45th               |

Slovakia performs better in innovation outputs than innovation inputs in 2023.

This year Slovakia ranks 51st in innovation inputs. This position is higher than last year.

Slovakia ranks 45th in innovation outputs. This position is the same as last year.

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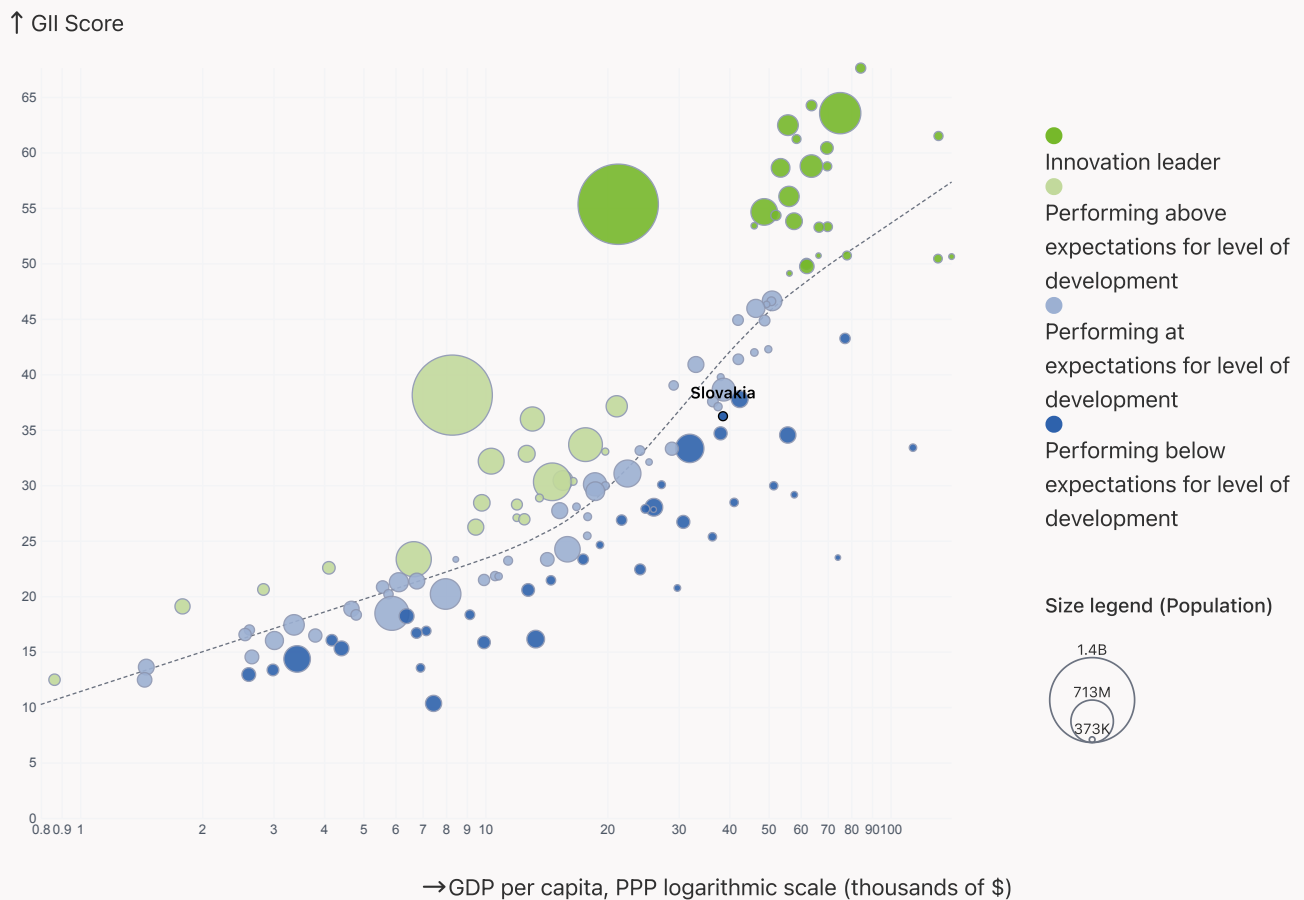
## → Expected vs. observed innovation performance

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, Slovakia's performance is below expectations for its level of development.

## > Innovation overperformers relative to their economic development



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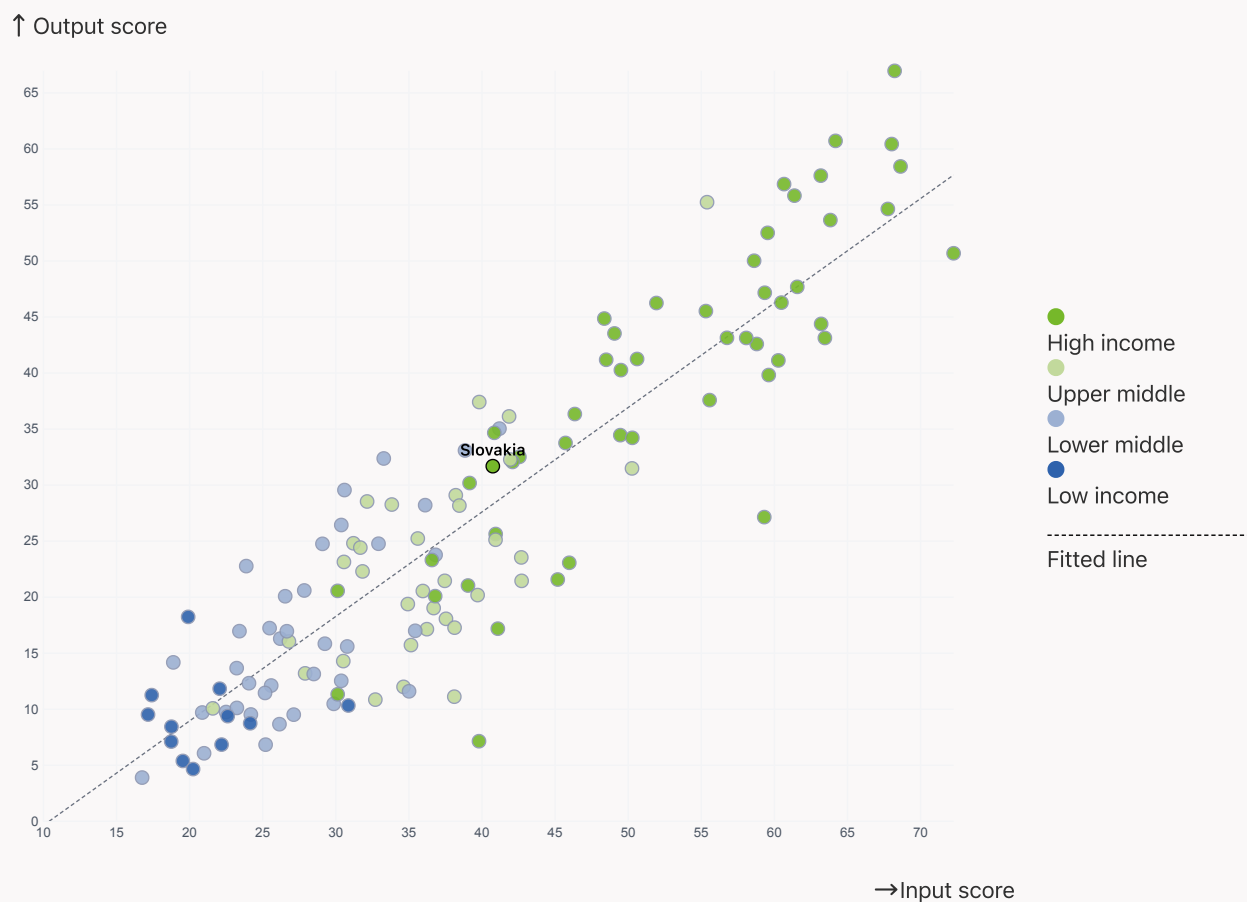
## → Effectively translating innovation investments into innovation outputs

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.



> Slovakia produces more innovation outputs relative to its level of innovation investments.

### > Relationship between innovation inputs and outputs



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

Highest rankings →

● 31st Knowledge and technology outputs

● 41st Infrastructure

● 45th Global Innovation Index

● 47th Business sophistication

● 53rd Human capital and research

● 56th Creative outputs

● 65th Institutions

← Lowest rankings

● 72nd Market sophistication

### > Highest rankings



Slovakia ranks highest in Knowledge and technology outputs (31st) and Infrastructure (41st).

### > Lowest rankings



Slovakia ranks lowest in Market sophistication (72nd), Institutions (65th) and Creative outputs (56th).



The full WIPO Intellectual Property Statistics profile for Slovakia can be found on [this link](#).

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

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

### > High-Income economies

Slovakia performs below the high-income group average in all the pillars.



### > Europe

Slovakia performs below the regional average in all the pillars.



### Knowledge and technology outputs

Top 10 | Score: 58.96

Europe | Score: 38.80

High income | Score: 38.62

Slovakia | Score: 34.69

### Creative outputs

Top 10 | 56.09

High income | 40.27

Europe | 39.87

Slovakia | 28.58

### Business sophistication

Top 10 | 64.39

High income | 46.38

Europe | 44.61

Slovakia | 33.42

### Market sophistication

Top 10 | 61.93

High income | 46.42

Europe | 43.65

Slovakia | 33.53

### Human capital and research

Top 10 | 60.28

High income | 46.30

Europe | 44.05

Slovakia | 33.95

### Infrastructure

Top 10 | 62.83

High income | 55.85

Europe | 54.69

Slovakia | 53.16

### Institutions

Top 10 | 79.85

High income | 68.16

Europe | 61.69

Slovakia | 49.87

# Global Innovation Index 2023



## → Innovation strengths and weaknesses in Slovakia

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



> Slovakia's main innovation strengths are **High-tech manufacturing, %** (rank 3), **ISO 14001 environment/bn PPP\$ GDP** (rank 7) and **Creative goods exports, % total trade** (rank 8).

### Strengths

### Weaknesses

| Rank | Code  | Indicator name                        | Rank | Code  | Indicator name                                 |
|------|-------|---------------------------------------|------|-------|--|
| 3    | 6.2.4 | High-tech manufacturing, %            | 109  | 5.3.4 | FDI net inflows, % GDP                         |
| 7    | 3.3.3 | ISO 14001 environment/bn PPP\$ GDP    | 109  | 1.3.1 | Policies for doing business                    |
| 8    | 7.2.4 | Creative goods exports, % total trade | 101  | 5.2.1 | University-industry R&D collaboration          |
| 9    | 6.3.5 | ISO 9001 quality/bn PPP\$ GDP         | 83   | 4.2.4 | VC received, value, % GDP                      |
| 13   | 6.3.2 | Production and export complexity      | 82   | 4.2.3 | VC recipients, deals/bn PPP\$ GDP              |
| 15   | 7.2.2 | National feature films/mn pop. 15-69  | 81   | 1.3.2 | Entrepreneurship policies and culture          |
| 18   | 3.3.2 | Environmental performance             | 79   | 7.1.1 | Intangible asset intensity, top 15, %          |
| 23   | 7.3.2 | Country-code TLDs/th pop. 15-69       | 48   | 6.2.2 | Unicorn valuation, % GDP                       |
| 23   | 5.3.2 | High-tech imports, % total trade      | 40   | 2.3.3 | Global corporate R&D investors, top 3, mn US\$ |
| 24   | 6.3.3 | High-tech exports, % total trade      |      |       |  |



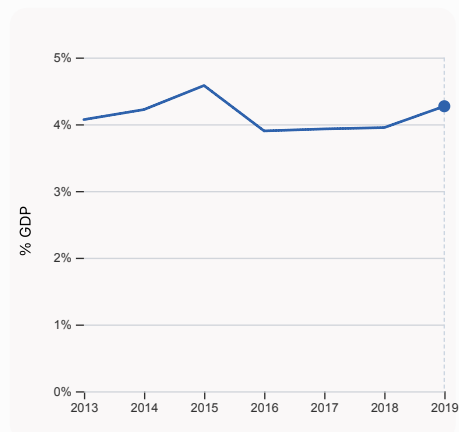
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## → Slovakia's innovation system

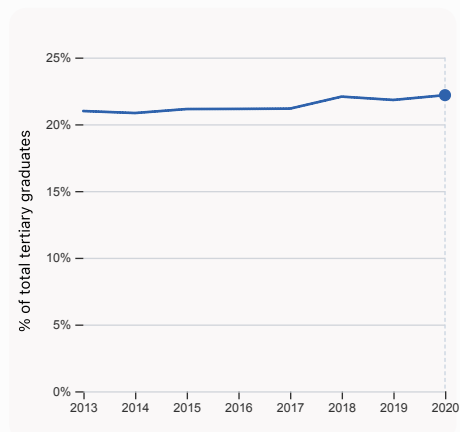
As far as practicable, the plots below present unscaled indicator data.

### > Innovation inputs in Slovakia



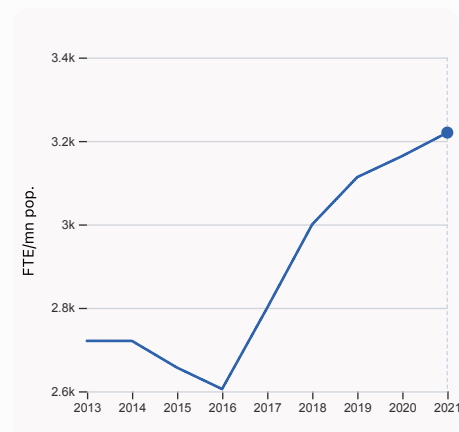
#### 2.1.1 Expenditure on education, % GDP

was equal to 4.27% GDP in 2019, up by 0.32 percentage points from the year prior – and equivalent to an indicator rank of 61.



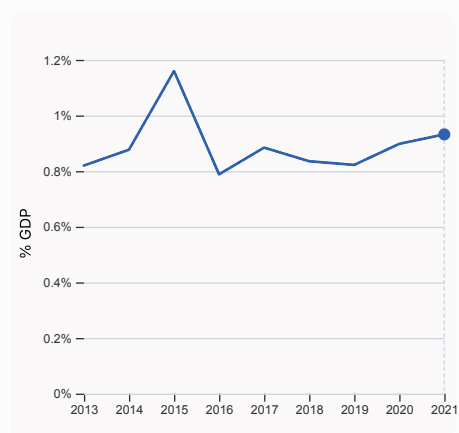
#### 2.2.2 Graduates in science and engineering, %

was equal to 22.18% of total tertiary graduates in 2020, up by 0.36 percentage points from the year prior – and equivalent to an indicator rank of 60.



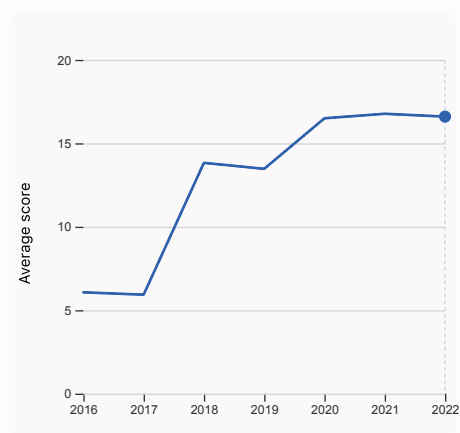
#### 2.3.1 Researchers, FTE/mn pop.

was equal to 3,220.01 FTE/mn pop. in 2021, up by 1.77% from the year prior – and equivalent to an indicator rank of 31.



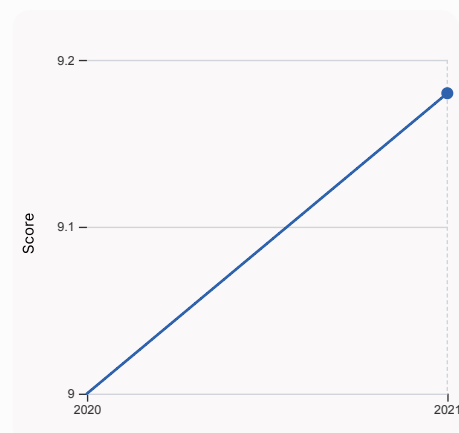
#### 2.3.2 Gross expenditure on R&D, % GDP

was equal to 0.932% GDP in 2021, up by 0.034 percentage points from the year prior – and equivalent to an indicator rank of 44.



#### 2.3.4 QS university ranking, top 3

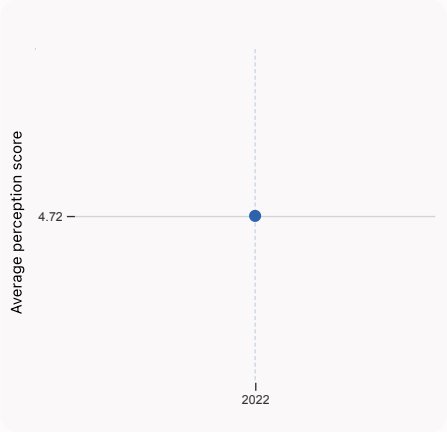
was equal to an average score of 16.6 for the top 3 universities in 2022, down by 1.014% from the year prior – and equivalent to an indicator rank of 58.



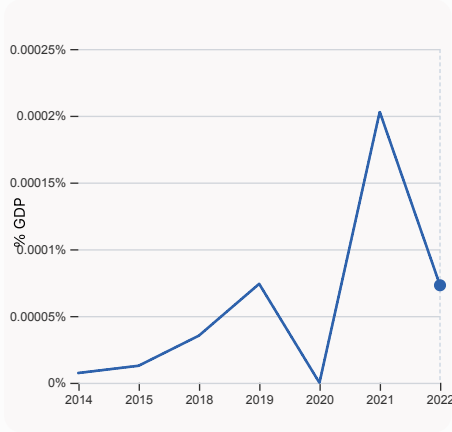
#### 3.1.1 ICT access

was equal to a score of 9.18 in 2021, up by 2% from the year prior – and equivalent to an indicator rank of 35.

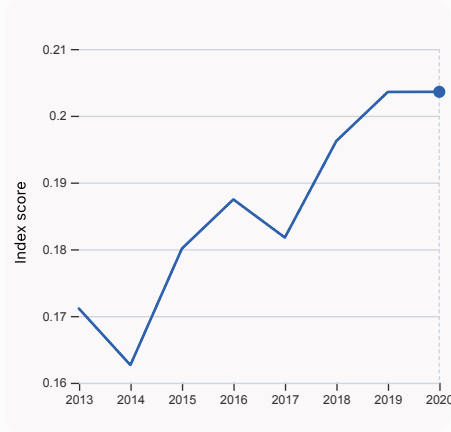
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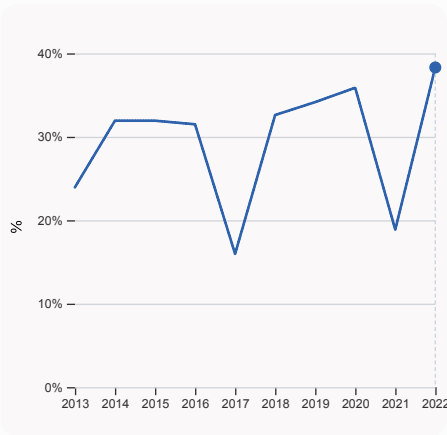
**4.1.1 Finance for startups and scaleups**  
was equal to an average perception score of 4.72 in 2022, equivalent to an indicator rank of 42.



**4.2.4 VC received, value, % GDP**  
was equal to 0.00007% GDP in 2022, down by 0.00013 percentage points from the year prior – and equivalent to an indicator rank of 83.



**4.3.2 Domestic industry diversification**  
was equal to an index score of 0.204 in 2020, up by 0.0086% from the year prior – and equivalent to an indicator rank of 69.



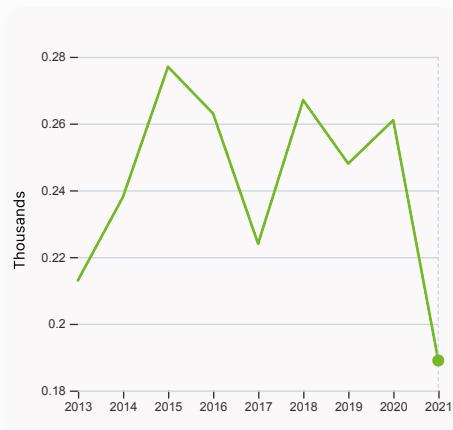
**5.1.1 Knowledge-intensive employment, %**  
was equal to 38.31% in 2022, up by 19.43 percentage points from the year prior – and equivalent to an indicator rank of 34.



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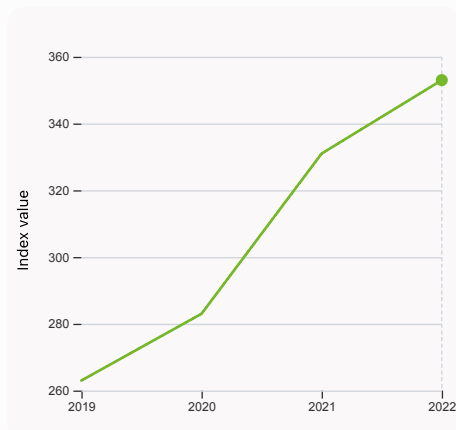


## > Innovation outputs in Slovakia



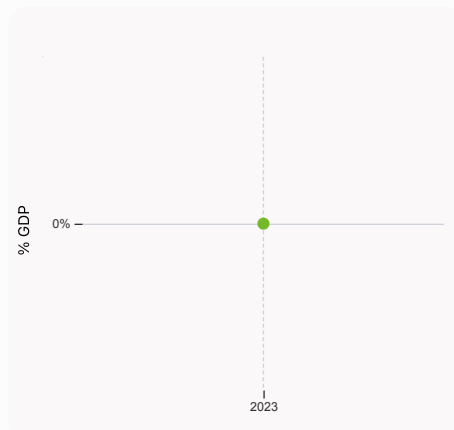
### 6.1.1 Patents by origin

was equal to 0.19 Thousands in 2021, down by 27.59% from the year prior – and equivalent to an indicator rank of 58.



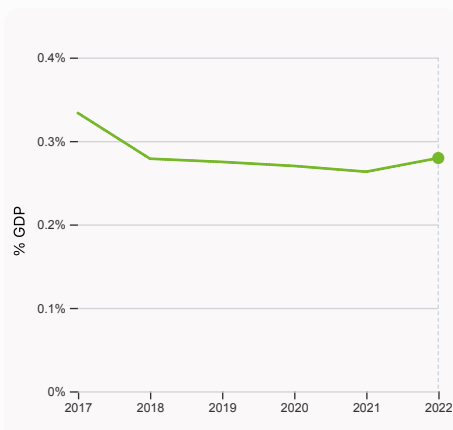
### 6.1.5 Citable documents H-index

was equal to an index value of 353 in 2022, up by 6.65% from the year prior – and equivalent to an indicator rank of 50.



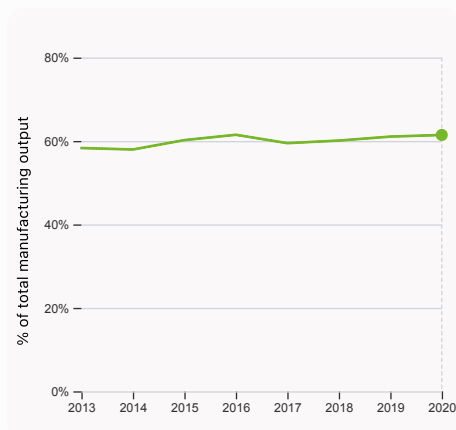
### 6.2.2 Unicorn valuation, % GDP

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



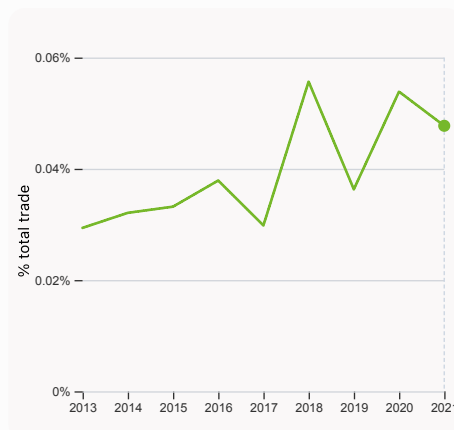
### 6.2.3 Software spending, % GDP

was equal to 0.28% GDP in 2022, up by 0.016 percentage points from the year prior – and equivalent to an indicator rank of 49.



### 6.2.4 High-tech manufacturing, %

was equal to 61.44% of total manufacturing output in 2020, up by 0.39 percentage points from the year prior – and equivalent to an indicator rank of 3.



### 6.3.1 Intellectual property receipts, % total trade

was equal to 0.048% total trade in 2021, down by 0.0061 percentage points from the year prior – and equivalent to an indicator rank of 71.

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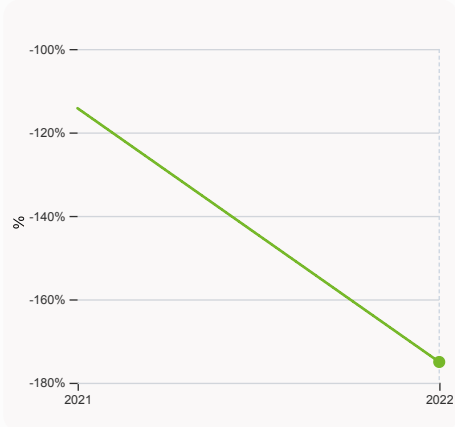
### 6.3.2 Production and export complexity

was equal to a score of 1.43 in 2020, down by 2.055% from the year prior – and equivalent to an indicator rank of 13.



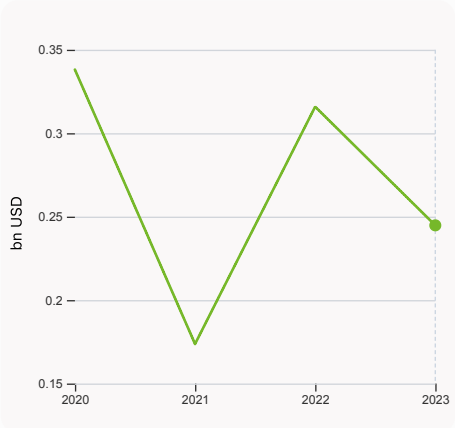
### 6.3.3 High-tech exports

was equal to 8,421,816,669 USD in 2021, up by 7.15% from the year prior – and equivalent to an indicator rank of 24.



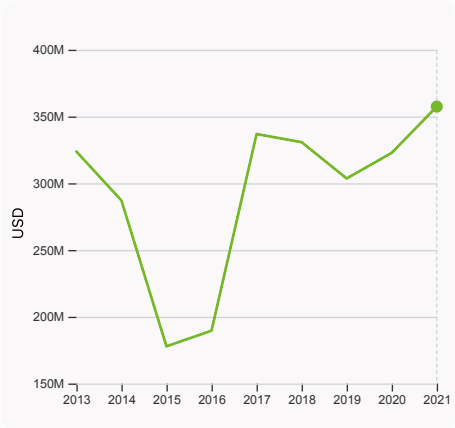
### 7.1.1 Intangible asset intensity, top 15, %

was equal to -175.016% in 2022, down by 60.81 percentage points from the year prior – and equivalent to an indicator rank of 79.



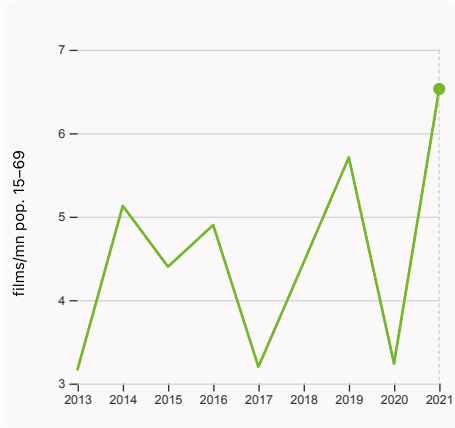
### 7.1.3 Global brand value, top 5,000

was equal to 0.245 bn USD in 2023, down by 22.5% from the year prior – and equivalent to an indicator rank of 72.



### 7.2.1 Cultural and creative services exports

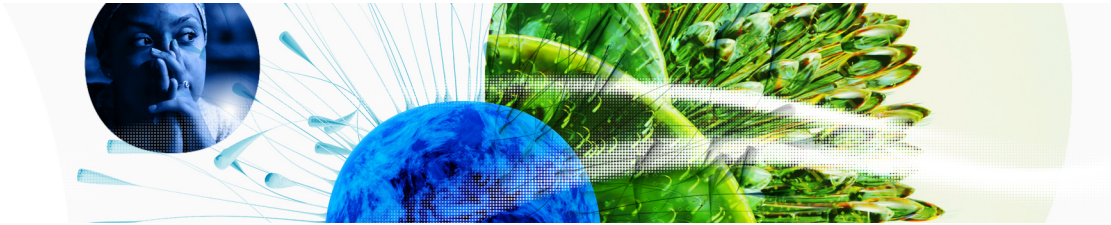
was equal to 357,448,000 USD in 2021, up by 10.74% from the year prior – and equivalent to an indicator rank of 63.



### 7.2.2 National feature films/mn pop. 15-69

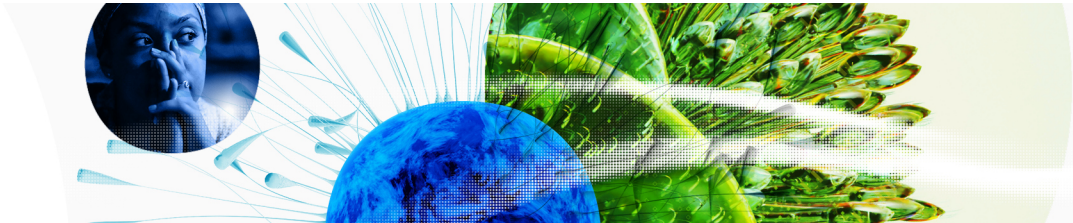
was equal to 6.53 films/mn pop. 15-69 in 2021, up by 101.54% from the year prior – and equivalent to an indicator rank of 15.

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### 7.3.4 Mobile app creation/bn PPP\$ GDP

was equal to 491,715.49 Apps/bn PPP\$ GDP in 2022, up by 10.82% from the year prior – and equivalent to an indicator rank of 44.



→ Slovakia's innovation top performers

> 2.3.4 QS university ranking of Slovakia’s top universities

| Rank     | University                               | Score |
|----------|--|-------|
| 651-700  | COMENIUS UNIVERSITY IN BRATISLAVA        | 18.50 |
| 701-750  | PAVOL JOZEF SAFARIK UNIVERSITY IN KOSICE | 17.40 |
| 801-1000 | UNIVERSITY OF ZILNA                      | 13.90 |

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".

> 7.1.1 Top 15 intangible-asset intensive companies in Slovakia

| Rank | Firm                      | Intensity, % |
|------|---------------------------|--------------|
| 1    | TATRY MOUNTAIN RESORTS AS | 25.09        |
| 2    | REAL ZA AS                | 22.02        |
| 3    | ANACOTT ACQUISITION CORP  | 47.00        |

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

> 7.1.3 Top 5,000 companies in Slovakia with highest global brand value

| Rank | Brand    | Industry  | Brand Value, mn USD |
|------|----------|-----------|---------------------|
| 1    | SLOVNAFT | Oil & Gas | 244.8               |

Source: Brand Finance (<https://brandirectory.com>).  
Note: Rank corresponds to within economy ranks.

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GII 2023 rank

45

## Slovakia

| Output rank   | Input rank | Income | Region | Population (mn)  | GDP, PPP\$ (bn) | GDP per capita, PPP\$ |
|---|------------|--------|--------|--|-----------------|-----------------------|
| 45  | 51         | High   | EUR    | 5.6  | 211.1           | 38,620.2              |
| Score / Value Rank  |            |        |        | Score / Value Rank   |                 |                       |
| Institutions49.965  |            |        |        | Business sophistication33.447                                    |                 |                       |
| 1.1 Institutional environment61.141                           |            |        |        | 5.1 Knowledge workers47.537                                      |                 |                       |
| 1.1.1 Operational stability for businesses*70.827             |            |        |        | 5.1.1 Knowledge-intensive employment, %38.334                    |                 |                       |
| 1.1.2 Government effectiveness*51.445                         |            |        |        | 5.1.2 Firms offering formal training, %43.328                    |                 |                       |
| 1.2 Regulatory environment70.642                              |            |        |        | 5.1.3 GERD performed by business, % GDP0.538                     |                 |                       |
| 1.2.1 Regulatory quality*64.833                               |            |        |        | 5.1.4 GERD financed by business, %43.738                         |                 |                       |
| 1.2.2 Rule of law*60.438                                      |            |        |        | 5.1.5 Females employed w/advanced degrees, %18.836               |                 |                       |
| 1.2.3 Cost of redundancy dismissal18.882                      |            |        |        | 5.2 Innovation linkages18.982                                    |                 |                       |
| 1.3 Business environment17.9124                               |            |        |        | 5.2.1 University-industry R&D collaboration+28.2101              |                 |                       |
| 1.3.1 Policies for doing business+28.2109                     |            |        |        | 5.2.2 State of cluster development+38.674                        |                 |                       |
| 1.3.2 Entrepreneurship policies and culture+7.681             |            |        |        | 5.2.3 GERD financed by abroad, % GDP0.130                        |                 |                       |
| Human capital and research33.953                              |            |        |        | 5.2.4 Joint venture/strategic alliance deals/bn PPP\$ GDP0.093   |                 |                       |
| 2.1 Education53.561   |            |        |        | 5.2.5 Patent families/bn PPP\$ GDP0.248                          |                 |                       |
| 2.1.1 Expenditure on education, % GDP4.361                    |            |        |        | 5.3 Knowledge absorption33.963                                   |                 |                       |
| 2.1.2 Government funding/pupil, secondary, % GDP/cap21.742    |            |        |        | 5.3.1 Intellectual property payments, % total trade0.754         |                 |                       |
| 2.1.3 School life expectancy, years14.665                     |            |        |        | 5.3.2 High-tech imports, % total trade11.423                     |                 |                       |
| 2.1.4 PISA scales in reading, maths and science469.438        |            |        |        | 5.3.3 ICT services imports, % total trade1.270                   |                 |                       |
| 2.1.5 Pupil-teacher ratio, secondary11.142                    |            |        |        | 5.3.4 FDI net inflows, % GDP0.6109                               |                 |                       |
| 2.2 Tertiary education31.762                                  |            |        |        | 5.3.5 Research talent, % in businesses27.247                     |                 |                       |
| 2.2.1 Tertiary enrolment, % gross47.668                       |            |        |        | Knowledge and technology outputs34.731                           |                 |                       |
| 2.2.2 Graduates in science and engineering, %22.260           |            |        |        | 6.1 Knowledge creation22.148                                     |                 |                       |
| 2.2.3 Tertiary inbound mobility, %10.325                      |            |        |        | 6.1.1 Patents by origin/bn PPP\$ GDP1.058                        |                 |                       |
| 2.3 Research and development (R&D)16.747                      |            |        |        | 6.1.2 PCT patents by origin/bn PPP\$ GDP0.246                    |                 |                       |
| 2.3.1 Researchers, FTE/mn pop.3,220.031                       |            |        |        | 6.1.3 Utility models by origin/bn PPP\$ GDP1.318                 |                 |                       |
| 2.3.2 Gross expenditure on R&D, % GDP0.944                    |            |        |        | 6.1.4 Scientific and technical articles/bn PPP\$ GDPn/an/a       |                 |                       |
| 2.3.3 Global corporate R&D investors, top 3, mn US\$0.040     |            |        |        | 6.1.5 Citable documents H-index17.350                            |                 |                       |
| 2.3.4 QS university ranking, top 3*16.858                     |            |        |        | 6.2 Knowledge impact39.730                                       |                 |                       |
| Infrastructure53.241  |            |        |        | 6.2.1 Labor productivity growth, %1.160                          |                 |                       |
| 3.1 Information and communication technologies (ICTs)71.761   |            |        |        | 6.2.2 Unicorn valuation, % GDP0.048                              |                 |                       |
| 3.1.1 ICT access*87.935                                       |            |        |        | 6.2.3 Software spending, % GDP0.349                              |                 |                       |
| 3.1.2 ICT use*83.746  |            |        |        | 6.2.4 High-tech manufacturing, %61.43                            |                 |                       |
| 3.1.3 Government's online service*69.762                      |            |        |        | 6.3 Knowledge diffusion42.328                                    |                 |                       |
| 3.1.4 E-participation*45.381                                  |            |        |        | 6.3.1 Intellectual property receipts, % total trade0.071         |                 |                       |
| 3.2 General infrastructure32.050                              |            |        |        | 6.3.2 Production and export complexity82.513                     |                 |                       |
| 3.2.1 Electricity output, GWh/mn pop.5,397.244                |            |        |        | 6.3.3 High-tech exports, % total trade7.924                      |                 |                       |
| 3.2.2 Logistics performance*54.542                            |            |        |        | 6.3.4 ICT services exports, % total trade1.862                   |                 |                       |
| 3.2.3 Gross capital formation, % GDP20.596                    |            |        |        | 6.3.5 ISO 9001 quality/bn PPP\$ GDP21.29                         |                 |                       |
| 3.3 Ecological sustainability55.811                           |            |        |        | Creative outputs28.656   |                 |                       |
| 3.3.1 GDP/unit of energy use10.164                            |            |        |        | 7.1 Intangible assets19.287                                      |                 |                       |
| 3.3.2 Environmental performance*69.718                        |            |        |        | 7.1.1 Intangible asset intensity, top 15, %-175.079              |                 |                       |
| 3.3.3 ISO 14001 environment/bn PPP\$ GDP9.57                  |            |        |        | 7.1.2 Trademarks by origin/bn PPP\$ GDP61.736                    |                 |                       |
| Market sophistication33.572                                   |            |        |        | 7.1.3 Global brand value, top 5,0000.272                         |                 |                       |
| 4.1 Credit38.643  |            |        |        | 7.1.4 Industrial designs by origin/bn PPP\$ GDP2.539             |                 |                       |
| 4.1.1 Finance for startups and scaleups+53.342                |            |        |        | 7.2 Creative goods and services43.210                            |                 |                       |
| 4.1.2 Domestic credit to private sector, % GDP66.256          |            |        |        | 7.2.1 Cultural and creative services exports, % total trade0.363 |                 |                       |
| 4.1.3 Loans from microfinance institutions, % GDPn/an/a       |            |        |        | 7.2.2 National feature films/mn pop. 15-696.515                  |                 |                       |
| 4.2 Investment2.795   |            |        |        | 7.2.3 Entertainment and media market/th pop. 15-69n/an/a         |                 |                       |
| 4.2.1 Market capitalization, % GDP5.674                       |            |        |        | 7.2.4 Creative goods exports, % total trade6.98                  |                 |                       |
| 4.2.2 Venture capital (VC) investors, deals/bn PPP\$ GDP0.058 |            |        |        | 7.3 Online creativity32.637                                      |                 |                       |
| 4.2.3 VC recipients, deals/bn PPP\$ GDP0.082                  |            |        |        | 7.3.1 Generic top-level domains (TLDs)/th pop. 15-693.763        |                 |                       |
| 4.2.4 VC received, value, % GDP0.083                          |            |        |        | 7.3.2 Country-code TLDs/th pop. 15-6932.623                      |                 |                       |
| 4.3 Trade, diversification, and market scale59.260            |            |        |        | 7.3.3 GitHub commits/mn pop. 15-6922.440                         |                 |                       |
| 4.3.1 Applied tariff rate, weighted avg., %1.520              |            |        |        | 7.3.4 Mobile app creation/bn PPP\$ GDP71.944                     |                 |                       |
| 4.3.2 Domestic industry diversification82.869                 |            |        |        |  |                 |                       |
| 4.3.3 Domestic market scale, bn PPP\$211.167                  |            |        |        |  |                 |                       |

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.





→ Data availability

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



> Slovakia has missing data for two indicators and outdated data for two indicators.

> Missing data for Slovakia

| Code  | Indicator name                               | Economy Year | Model Year | Source   |
|-------|--|--------------|------------|--|
| 4.1.3 | Loans from microfinance institutions, % GDP  | n/a          | 2021       | International Monetary Fund, Financial Access Survey (FAS)                         |
| 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 Slovakia

| Code  | Indicator name                  | Economy Year | Model Year | Source                                    |
|-------|---------------------------------|--------------|------------|---|
| 2.1.1 | Expenditure on education, % GDP | 2019         | 2021       | UNESCO Institute for Statistics           |
| 4.2.1 | Market capitalization, % GDP    | 2014         | 2020       | World Federation of Exchanges; World Bank |



# 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.



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.