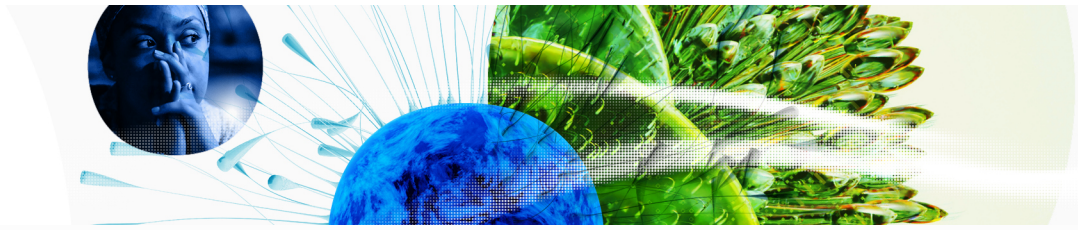
Global Innovation Index 2023



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**.

Serbia ranking in the Global Innovation Index 2023

> Serbia ranks 53rd among the 132 economies featured in the GII 2023.

> Serbia ranks 8th among the 33 upper-middle-income group economies.

> Serbia ranks 32nd among the 39 economies in Europe.

> Serbia GII Ranking (2020-2023)

The table shows the rankings of Serbia 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 Serbia in the GII 2023 is between ranks 49 and 67.

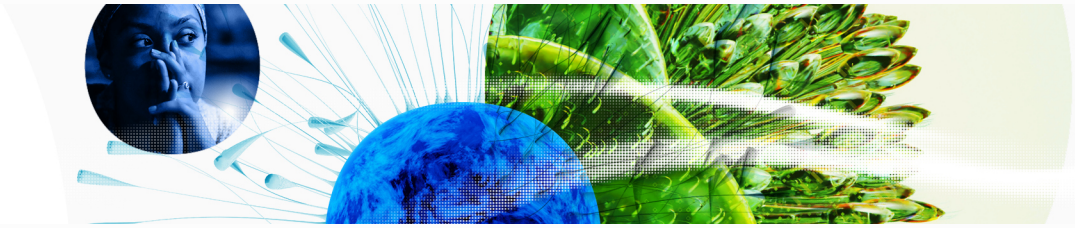
	GII Position	Innovation Inputs	Innovation Outputs
2020	53rd	58th	56th
2021	54th	50th	57th
2022	55th	55th	58th
2023	53rd	41st	64th

Serbia performs worse in **innovation outputs** than innovation inputs in 2023.

This year **Serbia ranks 41st in innovation inputs.** This position is higher than last year.

Serbia ranks 64th in innovation outputs. This position is lower than last year.

Global Innovation Index 2023

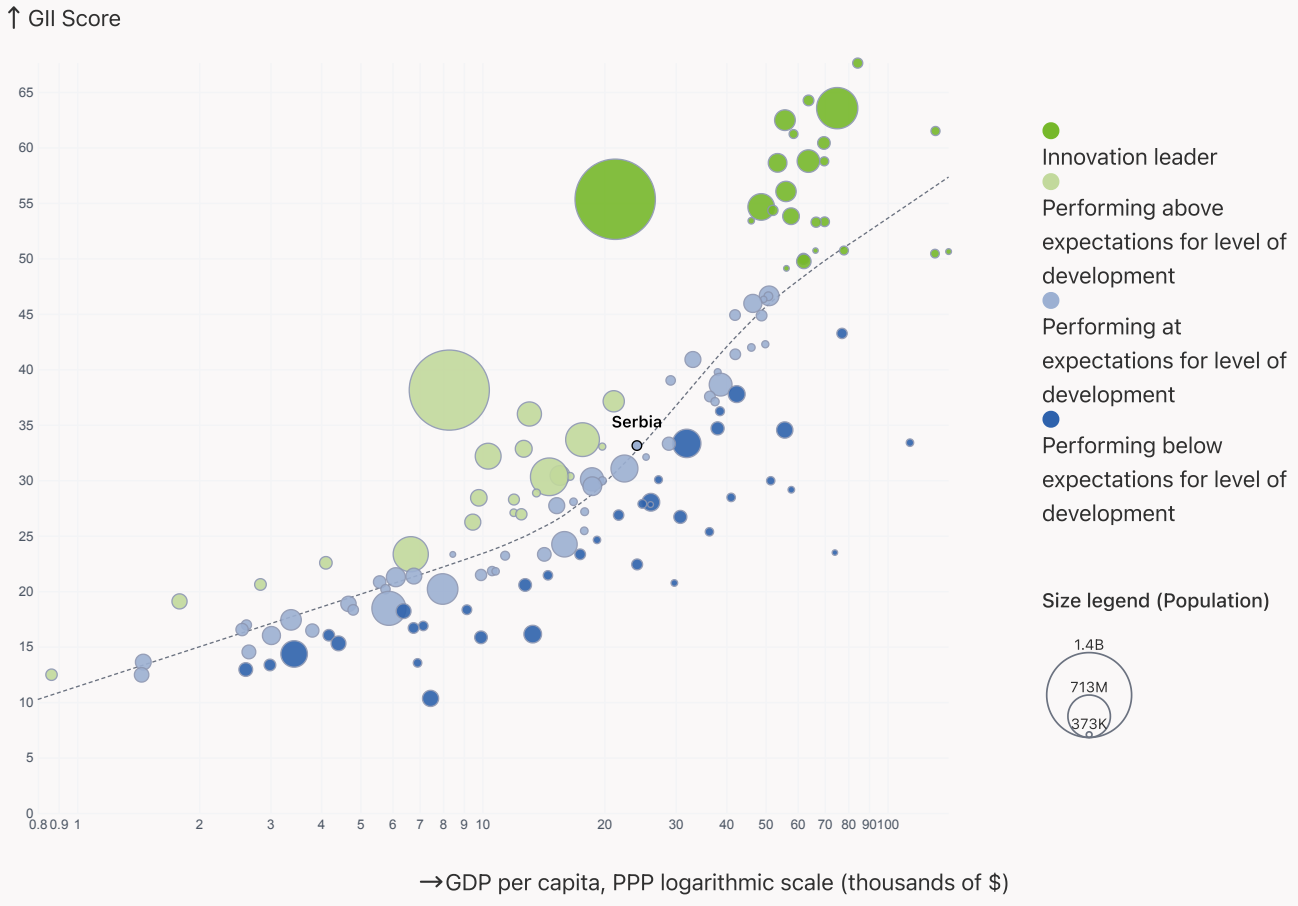


→ Expected vs. observed innovation performance

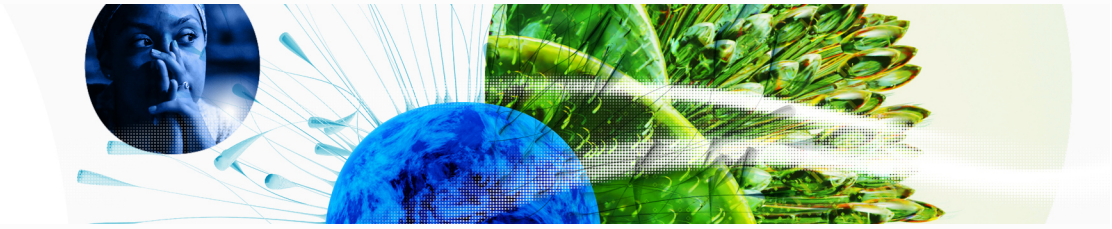
The bubble chart below shows the relationship between income levels (GDP per capita) and innovation performance (GII score). The trend line gives an indication of the expected innovation performance according to income level. Economies appearing above the trend line are performing better than expected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

> Relative to GDP, Serbia's performance is at expectations for its level of development.

> Innovation overperformers relative to their economic development



Global Innovation Index 2023

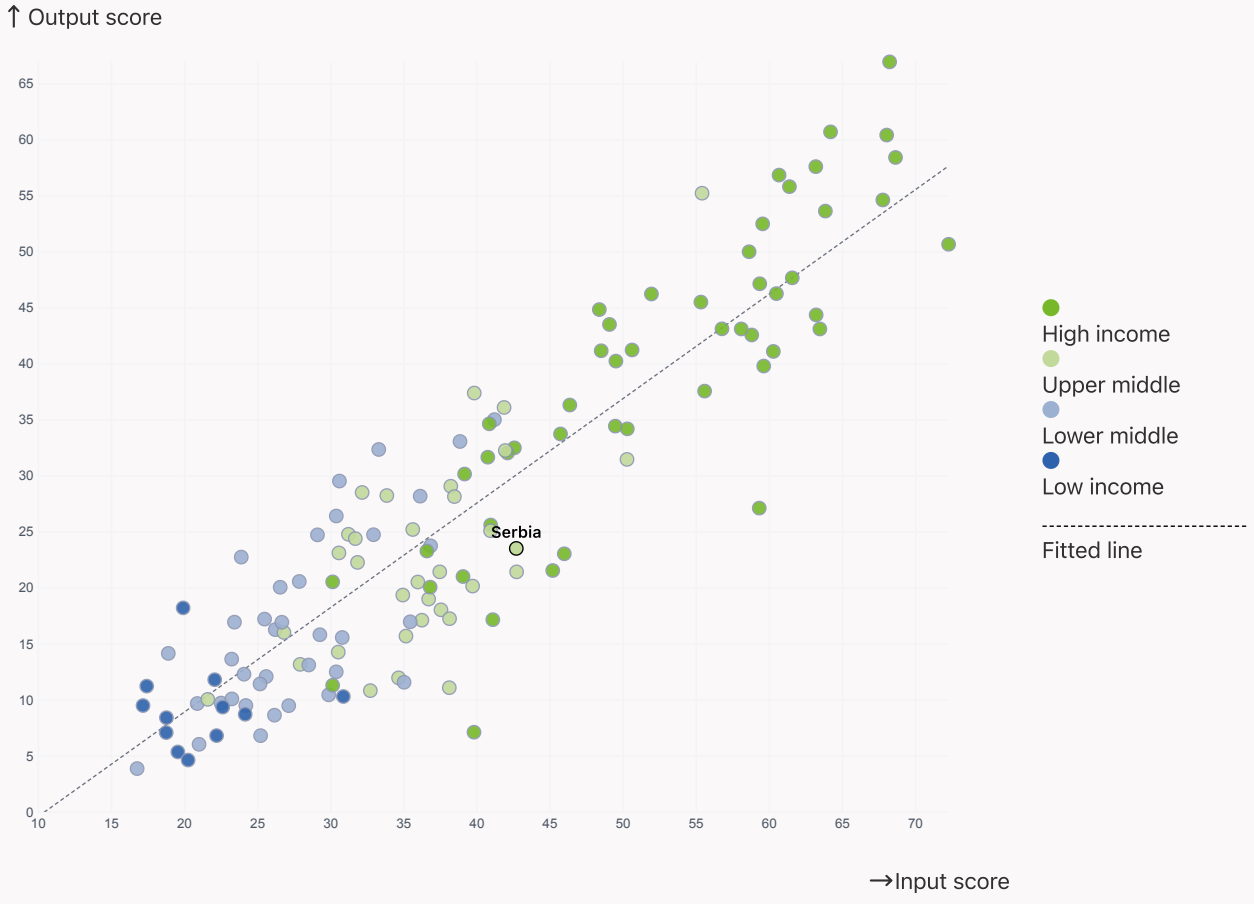


→ Effectively translating innovation investments into innovation outputs

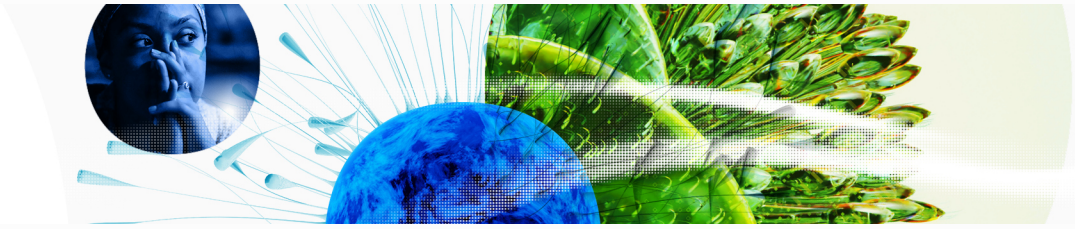
The chart below shows the relationship between innovation inputs and innovation outputs. Economies above the line are effectively translating costly innovation investments into more and higher-quality outputs.

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

> Relationship between innovation inputs and outputs

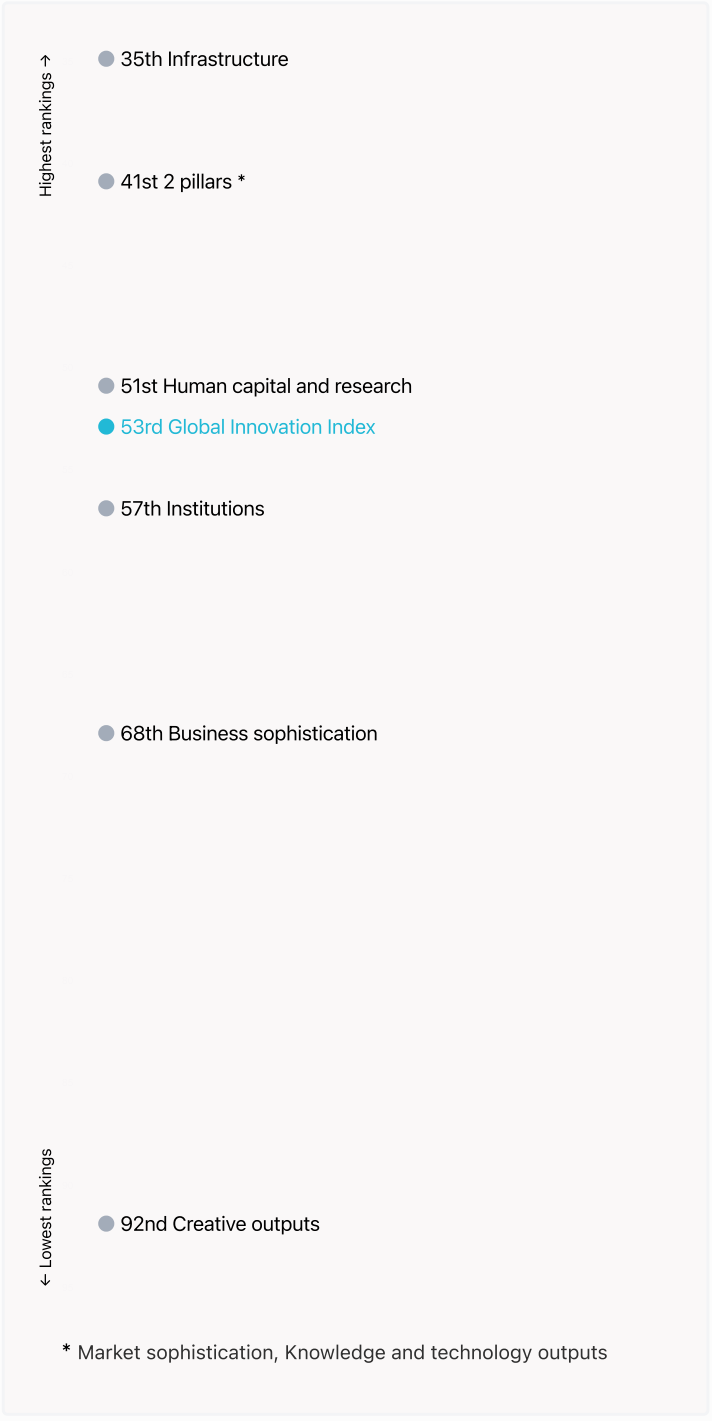


Global Innovation Index 2023



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



> Highest rankings

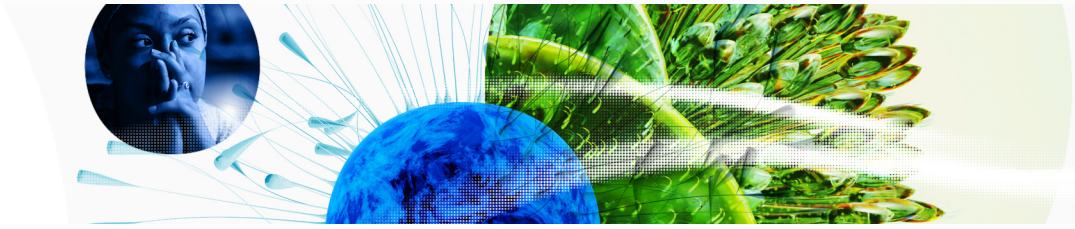
Serbia ranks highest in Infrastructure (35th), Market sophistication, Knowledge and technology outputs (41st) and Human capital and research (51st).

> Lowest rankings

Serbia ranks lowest in Creative outputs (92nd), Business sophistication (68th) and Institutions (57th).

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

Global Innovation Index 2023



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

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

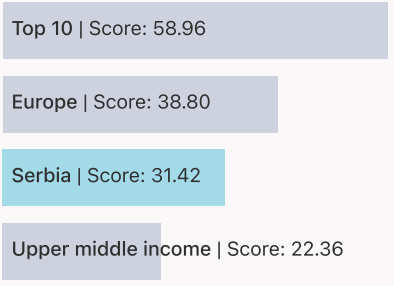
> Upper-Middle-Income economies

Serbia performs above the upper-middle-income group average in Knowledge and technology outputs, Market sophistication, Human capital and research, Infrastructure, Institutions.

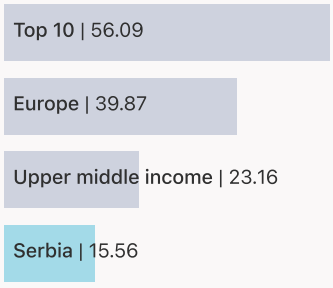
> Europe

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

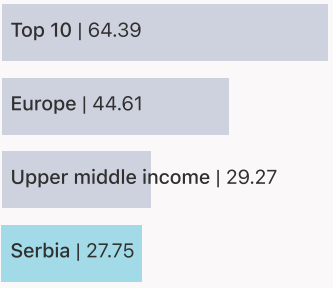
Knowledge and technology outputs



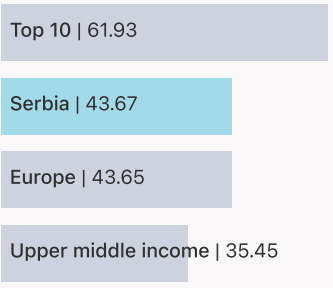
Creative outputs



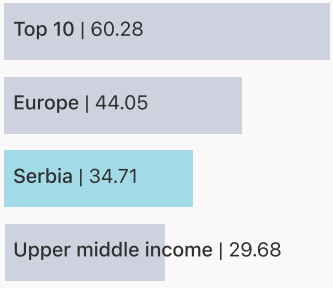
Business sophistication



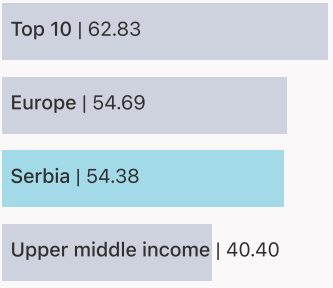
Market sophistication



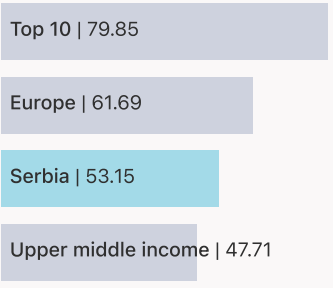
Human capital and research



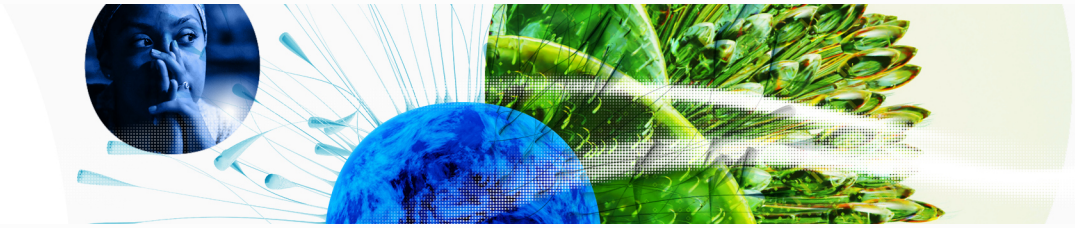
Infrastructure



Institutions



Global Innovation Index 2023



→ Innovation strengths and weaknesses in Serbia

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

> Serbia's main innovation strengths are **Cost of redundancy dismissal** (rank 1), **ISO 14001 environment/bn PPP$ GDP** (rank 2) and **ISO 9001 quality/bn PPP$ GDP** (rank 5).

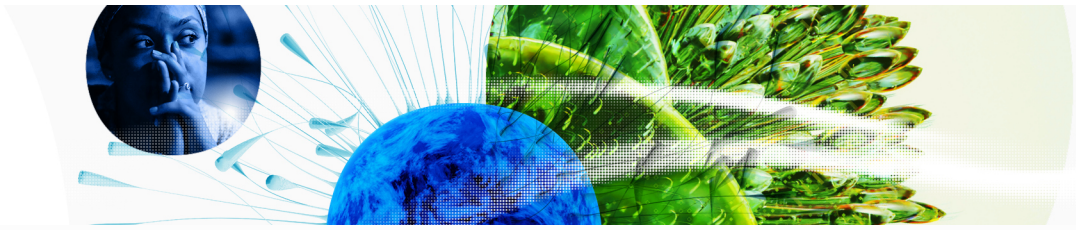
Strengths

Rank	Code	Indicator name
1	1.2.3	Cost of redundancy dismissal
2	3.3.3	ISO 14001 environment/bn PPP$ GDP
5	6.3.5	ISO 9001 quality/bn PPP$ GDP
5	2.1.5	Pupil-teacher ratio, secondary
11	5.3.4	FDI net inflows, % GDP
13	7.2.1	Cultural and creative services exports, % total trade
14	6.2.1	Labor productivity growth, %
14	6.1.4	Scientific and technical articles/bn PPP$ GDP
15	3.1.4	E-participation
17	6.3.4	ICT services exports, % total trade

Weaknesses

Rank	Code	Indicator name
112	6.2.3	Software spending, % GDP
92	5.2.4	Joint venture/strategic alliance deals/bn PPP$ GDP
87	5.1.4	GERD financed by business, %
79	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
66	4.1.1	Finance for startups and scaleups
61	5.3.5	Research talent, % in businesses
48	6.2.2	Unicorn valuation, % GDP
40	2.3.3	Global corporate R&D investors, top 3, mn US$

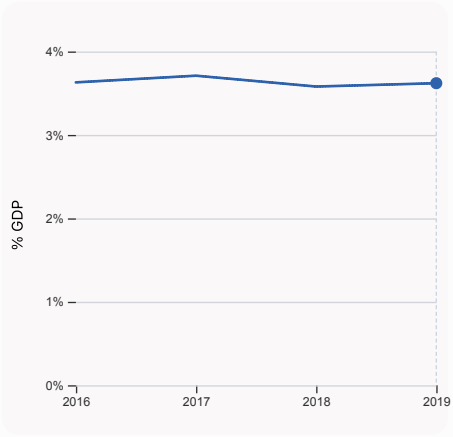
Global Innovation Index 2023



→ Serbia's innovation system

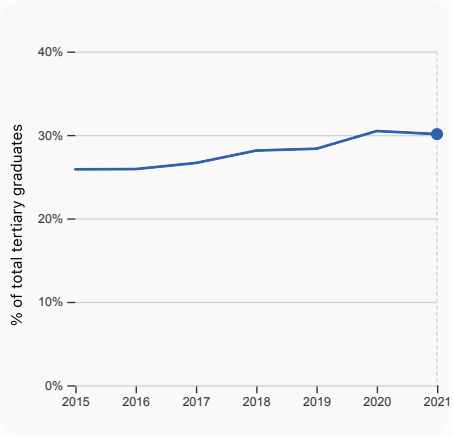
As far as practicable, the plots below present unscaled indicator data.

> Innovation inputs in Serbia



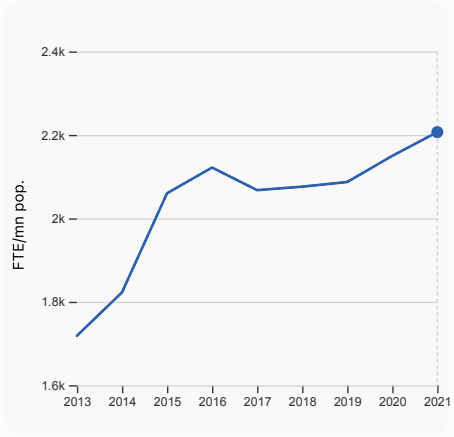
2.1.1 Expenditure on education, % GDP

was equal to 3.62% GDP in 2019, up by 0.04 percentage points from the year prior – and equivalent to an indicator rank of 85.



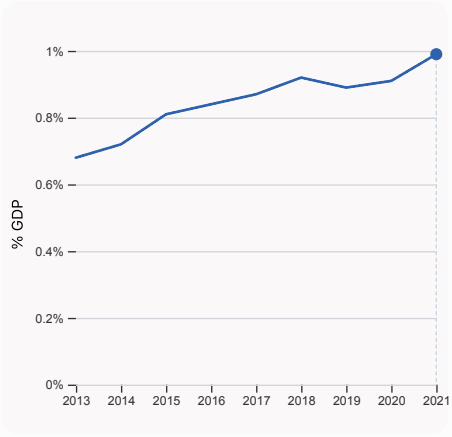
2.2.2 Graduates in science and engineering, %

was equal to 30.1% of total tertiary graduates in 2021, down by 0.37 percentage points from the year prior – and equivalent to an indicator rank of 20.



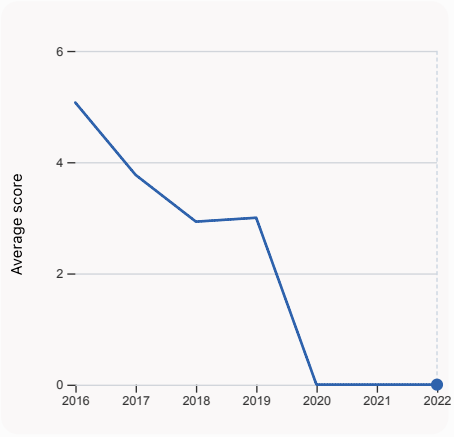
2.3.1 Researchers, FTE/mn pop.

was equal to 2,206.78 FTE/mn pop. in 2021, up by 2.65% from the year prior – and equivalent to an indicator rank of 38.



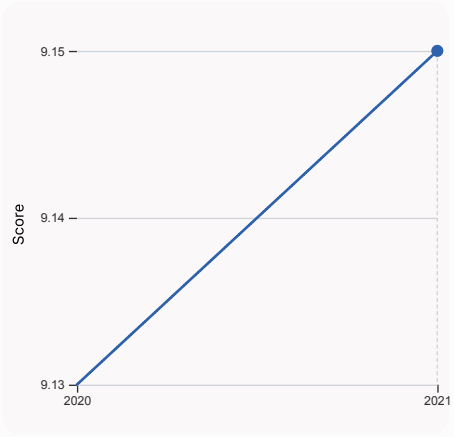
2.3.2 Gross expenditure on R&D, % GDP

was equal to 0.99% GDP in 2021, up by 0.08 percentage points from the year prior – and equivalent to an indicator rank of 40.



2.3.4 QS university ranking, top 3

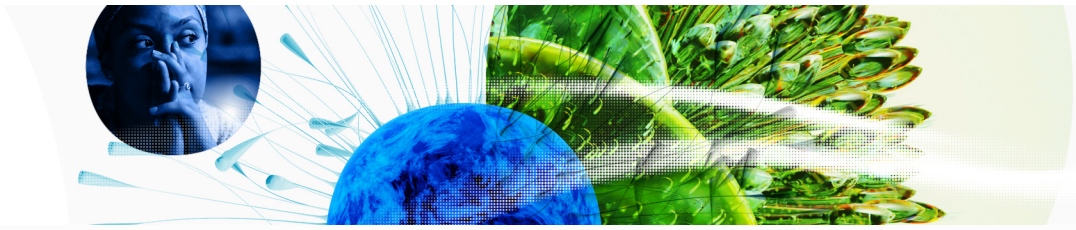
was equal to an average score of 0 for the top 3 universities in 2022, equivalent to an indicator rank of 71.

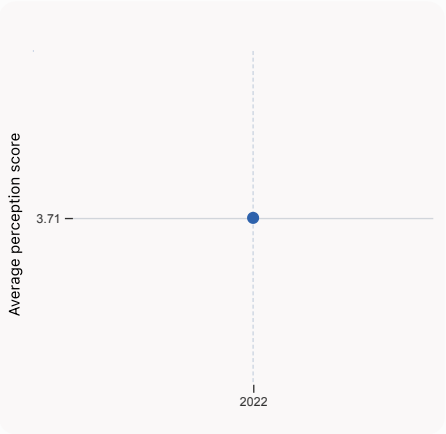


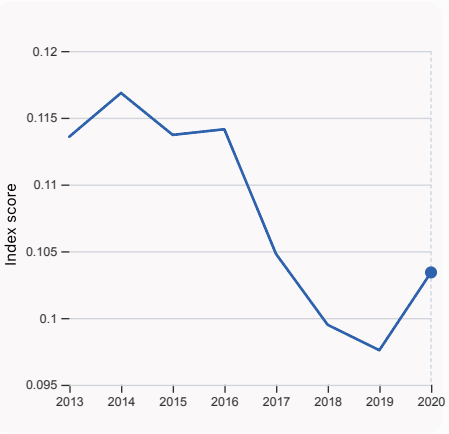
3.1.1 ICT access

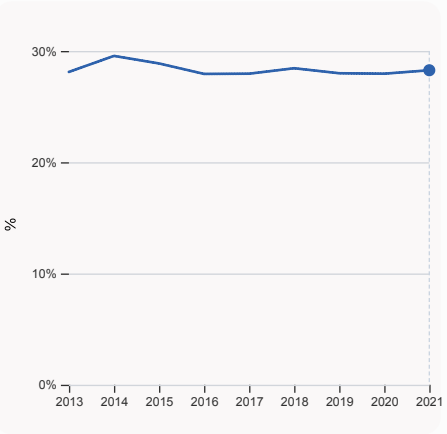
was equal to a score of 9.15 in 2021, up by 0.22% from the year prior – and equivalent to an indicator rank of 39.

Global Innovation Index 2023









4.1.1 Finance for startups and scaleups

was equal to an average perception score of 3.71 in 2022, equivalent to an indicator rank of 66.

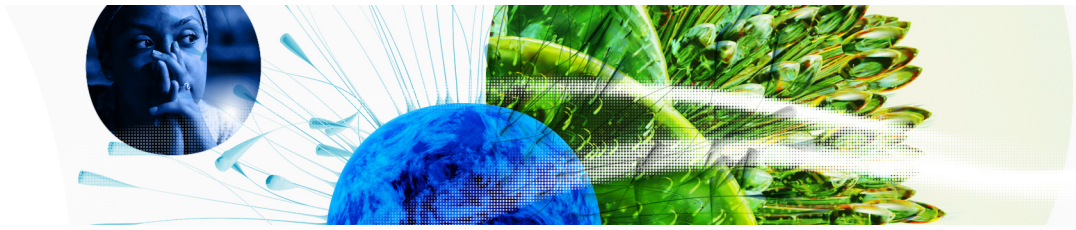
4.3.2 Domestic industry diversification

was equal to an index score of 0.103 in 2020, up by 5.97% from the year prior – and equivalent to an indicator rank of 21.

5.1.1 Knowledge-intensive employment, %

was equal to 28.27% in 2021, up by 0.31 percentage points from the year prior – and equivalent to an indicator rank of 49.

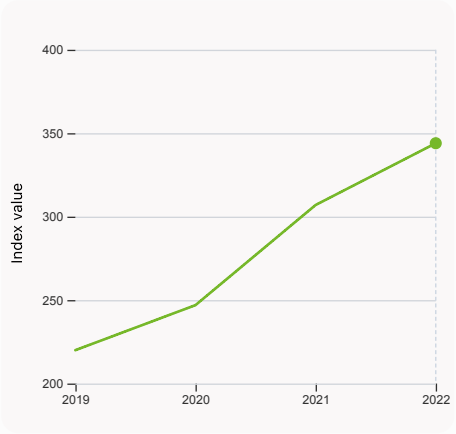
Global Innovation Index 2023



> Innovation outputs in Serbia

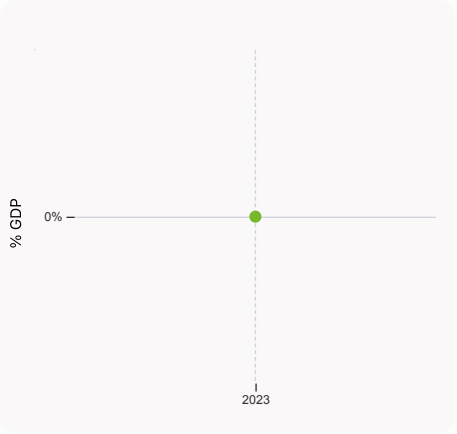
6.1.1 Patents by origin

was equal to 0.16 Thousands in 2021, up by 8.9% from the year prior – and equivalent to an indicator rank of 57.



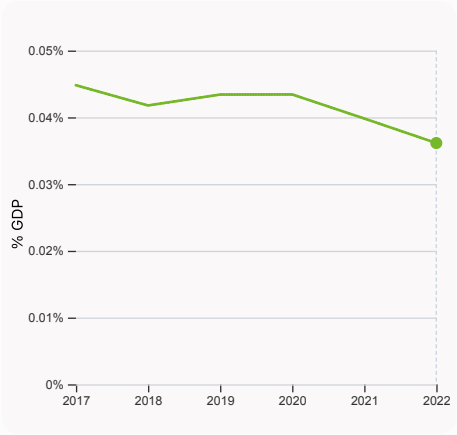
6.1.5 Citable documents H-index

was equal to an index value of 344 in 2022, up by 12.052% from the year prior – and equivalent to an indicator rank of 52.



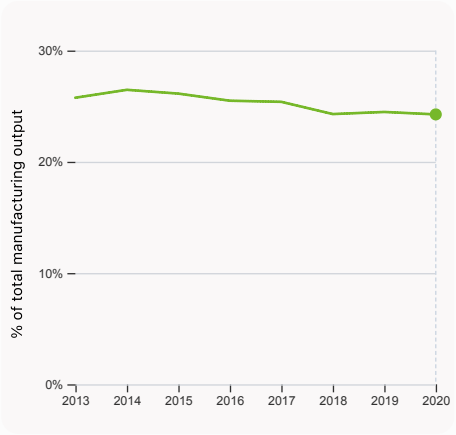
6.2.2 Unicorn valuation, % GDP

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



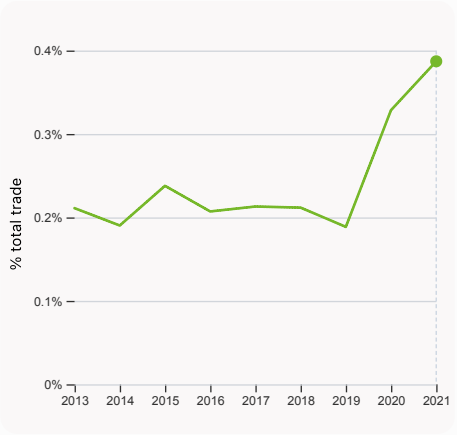
6.2.3 Software spending, % GDP

was equal to 0.036% GDP in 2022, down by 0.0037 percentage points from the year prior – and equivalent to an indicator rank of 112.



6.2.4 High-tech manufacturing, %

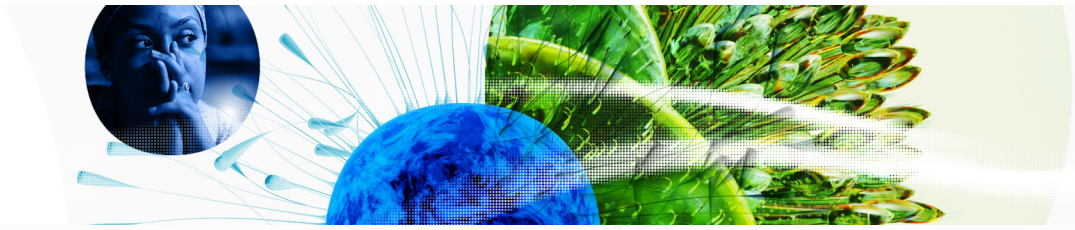
was equal to 24.26% of total manufacturing output in 2020, down by 0.22 percentage points from the year prior – and equivalent to an indicator rank of 54.

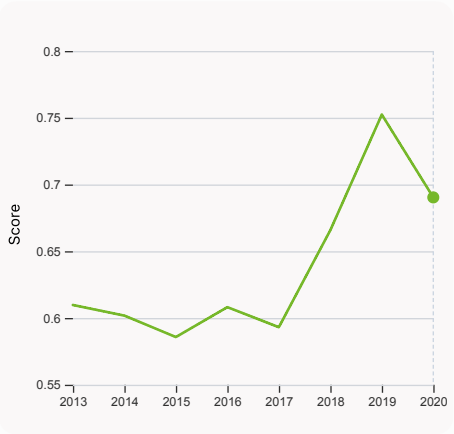


6.3.1 Intellectual property receipts, % total trade

was equal to 0.387% total trade in 2021, up by 0.059 percentage points from the year prior – and equivalent to an indicator rank of 36.

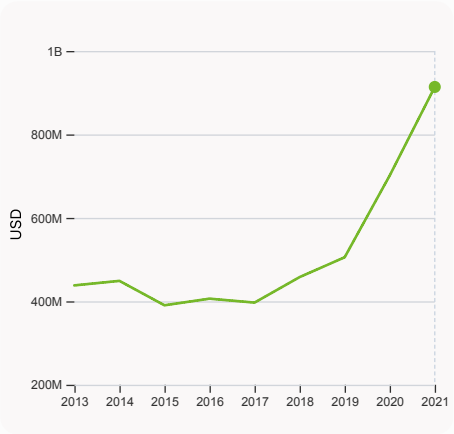
Global Innovation Index 2023





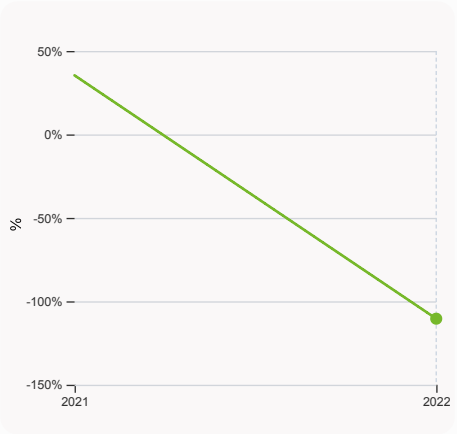
6.3.2 Production and export complexity

was equal to a score of 0.69 in 2020, down by 8.25% from the year prior – and equivalent to an indicator rank of 38.



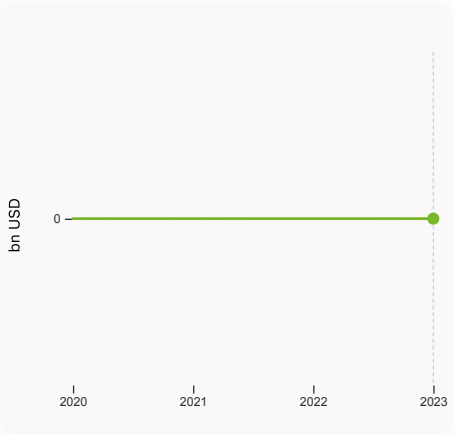
6.3.3 High-tech exports

was equal to 913,788,863 USD in 2021, up by 30.25% from the year prior – and equivalent to an indicator rank of 51.



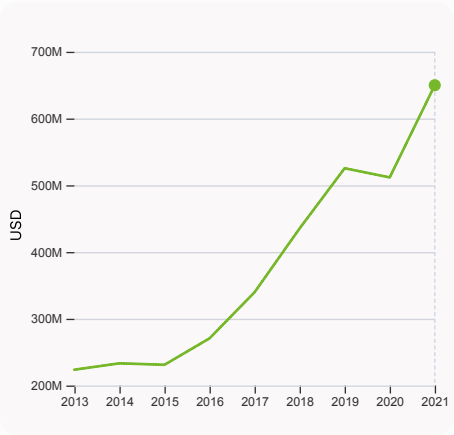
7.1.1 Intangible asset intensity, top 15, %

was equal to -110.411% in 2022, down by 145.8 percentage points from the year prior – and equivalent to an indicator rank of 79.



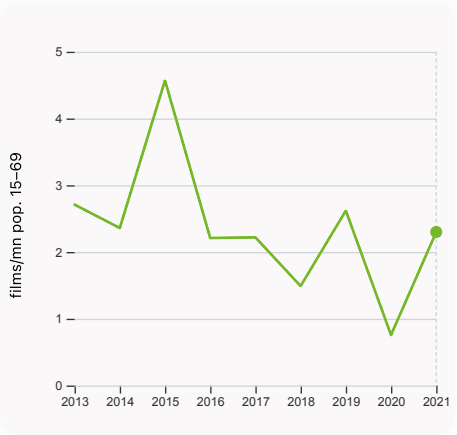
7.1.3 Global brand value, top 5,000

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



7.2.1 Cultural and creative services exports

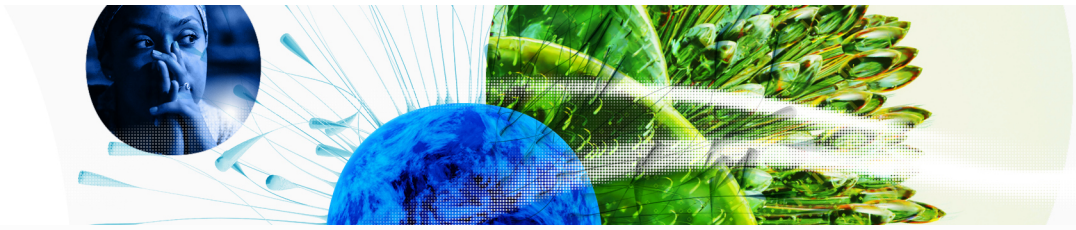
was equal to 649,884,000 USD in 2021, up by 26.98% from the year prior – and equivalent to an indicator rank of 13.

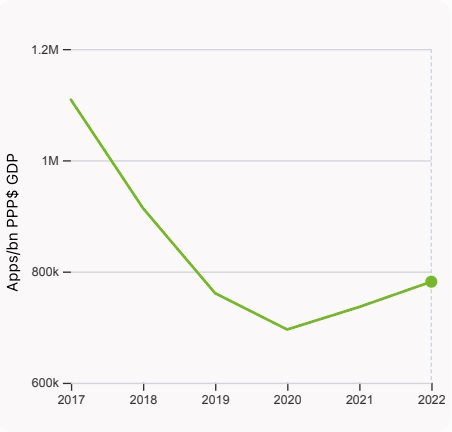


7.2.2 National feature films/mn pop. 15-69

was equal to 2.3 films/mn pop. 15–69 in 2021, up by 203.53% from the year prior – and equivalent to an indicator rank of 44.

Global Innovation Index 2023

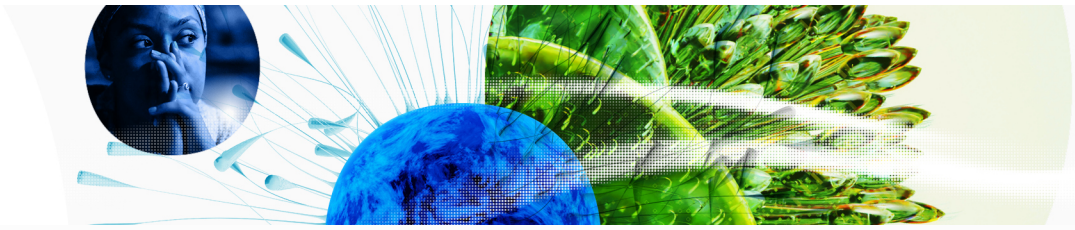




7.3.4 Mobile app creation/bn PPP$ GDP

was equal to 781,655.94 Apps/bn PPP$ GDP in 2022, up by 6.16% from the year prior – and equivalent to an indicator rank of 28.

Global Innovation Index 2023



→ Serbia's innovation top performers

> 2.3.4 QS university ranking of Serbia's top universities

Rank	University	Score
1001-1200	UNIVERSITY OF BELGRADE	10.00
1201-1400	UNIVERSITY OF NOVI SAD	6.40
1201-1400	UNIVERSITY OF NIS	6.20

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 Serbia

Rank	Firm	Intensity, %
1	FINTEL ENERGIJA AD	58.70
2	AERODROM NIKOLA TESLA AD BEOGRAD	31.40
3	GOSA MONTAZA AD VELIKA PLANA	--

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

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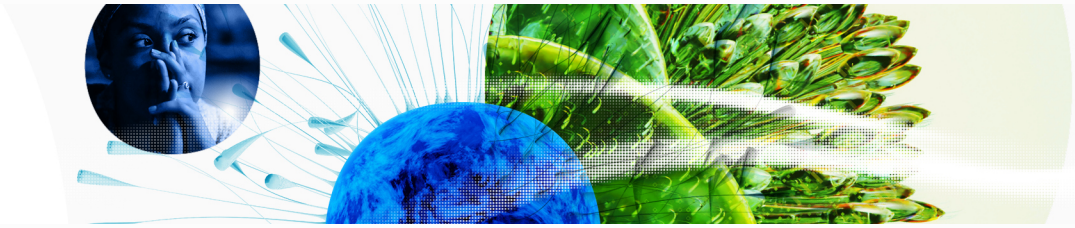

Serbia

GII 2023 rank **53**

Output rank	Input rank	Income	Region	Population (mn)	GDP, PPP$ (bn)	GDP per capita, PPP$
64	41	Upper middle	EUR	7.2	164.8	24,084.4

	Score / Value	Rank
Institutions	**53.2**	**57**
1.1 Institutional environment	**45.1**	**66**
1.1.1 Operational stability for businesses*	52.1	69
1.1.2 Government effectiveness*	38.1	66
1.2 Regulatory environment	**70.1**	**43**
1.2.1 Regulatory quality*	43.5	71
1.2.2 Rule of law*	37.0	68
1.2.3 Cost of redundancy dismissal	8.0	1 ●
1.3 Business environment	**44.3**	**72**
1.3.1 Policies for doing business†	46.0	68
1.3.2 Entrepreneurship policies and culture†	42.5	45
Human capital and research	**34.7**	**51**
2.1 Education	**54.9**	**55**
2.1.1 Expenditure on education, % GDP	3.6	85
2.1.2 Government funding/pupil, secondary, % GDP/cap	n/a	n/a
2.1.3 School life expectancy, years	14.4	66
2.1.4 PISA scales in reading, maths and science	442.5	44
2.1.5 Pupil-teacher ratio, secondary	7.6	5 ●
2.2 Tertiary education	**39.1**	**36**
2.2.1 Tertiary enrolment, % gross	69.2	42
2.2.2 Graduates in science and engineering, %	30.1	20
2.2.3 Tertiary inbound mobility, %	4.5	52
2.3 Research and development (R&D)	**10.1**	**60**
2.3.1 Researchers, FTE/mn pop.	2,206.8	38
2.3.2 Gross expenditure on R&D, % GDP	1.0	40
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	**54.4**	**35**
3.1 Information and communication technologies (ICTs)	**83.3**	**26**
3.1.1 ICT access*	87.4	39
3.1.2 ICT use*	81.8	54
3.1.3 Government's online service*	83.6	26
3.1.4 E-participation*	80.2	15 ●
3.2 General infrastructure	**28.2**	**60**
3.2.1 Electricity output, GWh/mn pop.	5,482.2	42
3.2.2 Logistics performance*	31.8	71
3.2.3 Gross capital formation, % GDP	27.0	38
3.3 Ecological sustainability	**51.7**	**20**
3.3.1 GDP/unit of energy use	7.6	91
3.3.2 Environmental performance*	42.4	59
3.3.3 ISO 14001 environment/bn PPP$ GDP	12.3	2 ●
Market sophistication	**43.7**	**41**
4.1 Credit	**23.7**	**82**
4.1.1 Finance for startups and scaleups†	31.6	66 ○
4.1.2 Domestic credit to private sector, % GDP	45.5	79
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	**63.6**	**37**
4.3.1 Applied tariff rate, weighted avg., %	1.4	19
4.3.2 Domestic industry diversification	96.7	21
4.3.3 Domestic market scale, bn PPP$	164.8	75

	Score / Value	Rank
Business sophistication	**27.8**	**68**
5.1 Knowledge workers	**29.7**	**70**
5.1.1 Knowledge-intensive employment, %	28.3	49
5.1.2 Firms offering formal training, %	38.3	37
5.1.3 GERD performed by business, % GDP	0.5	42
5.1.4 GERD financed by business, %	2.1	87 ○ ◇
5.1.5 Females employed w/advanced degrees, %	15.2	49
5.2 Innovation linkages	**20.4**	**69**
5.2.1 University-industry R&D collaboration†	44.5	65
5.2.2 State of cluster development†	38.2	75
5.2.3 GERD financed by abroad, % GDP	0.1	40
5.2.4 Joint venture/strategic alliance deals/bn PPP$ GDP	0.0	92 ○
5.2.5 Patent families/bn PPP$ GDP	0.1	61
5.3 Knowledge absorption	**33.1**	**67**
5.3.1 Intellectual property payments, % total trade	1.2	28
5.3.2 High-tech imports, % total trade	6.8	90
5.3.3 ICT services imports, % total trade	1.8	45
5.3.4 FDI net inflows, % GDP	7.4	11 ●
5.3.5 Research talent, % in businesses	10.5	61 ○
Knowledge and technology outputs	**31.4**	**41**
6.1 Knowledge creation	**24.5**	**41**
6.1.1 Patents by origin/bn PPP$ GDP	1.1	57
6.1.2 PCT patents by origin/bn PPP$ GDP	0.2	49
6.1.3 Utility models by origin/bn PPP$ GDP	0.7	27
6.1.4 Scientific and technical articles/bn PPP$ GDP	n/a	n/a
6.1.5 Citable documents H-index	16.8	52
6.2 Knowledge impact	**26.4**	**66**
6.2.1 Labor productivity growth, %	3.1	14 ●
6.2.2 Unicorn valuation, % GDP	0.0	48 ○ ◇
6.2.3 Software spending, % GDP	0.0	112 ○ ◇
6.2.4 High-tech manufacturing, %	24.3	54
6.3 Knowledge diffusion	**43.4**	**27**
6.3.1 Intellectual property receipts, % total trade	0.3	36
6.3.2 Production and export complexity	67.0	38
6.3.3 High-tech exports, % total trade	2.5	51
6.3.4 ICT services exports, % total trade	6.0	17 ●
6.3.5 ISO 9001 quality/bn PPP$ GDP	23.6	5 ●
Creative outputs	**15.6**	**92**
7.1 Intangible assets	**8.7**	**110** ◇
7.1.1 Intangible asset intensity, top 15, %	-110.4	79 ○ ◇
7.1.2 Trademarks by origin/bn PPP$ GDP	25.8	82
7.1.3 Global brand value, top 5,000	0.0	74 ○ ◇
7.1.4 Industrial designs by origin/bn PPP$ GDP	0.9	72
7.2 Creative goods and services	**19.1**	**51**
7.2.1 Cultural and creative services exports, % total trade	1.8	13 ●
7.2.2 National feature films/mn pop. 15-69	2.3	44
7.2.3 Entertainment and media market/th pop. 15-69	n/a	n/a
7.2.4 Creative goods exports, % total trade	0.5	61
7.3 Online creativity	**25.7**	**49**
7.3.1 Generic top-level domains (TLDs)/th pop. 15-69	2.1	82
7.3.2 Country-code TLDs/th pop. 15-69	7.4	46
7.3.3 GitHub commits/mn pop. 15-69	19.0	46
7.3.4 Mobile app creation/bn PPP$ GDP	74.6	28

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.

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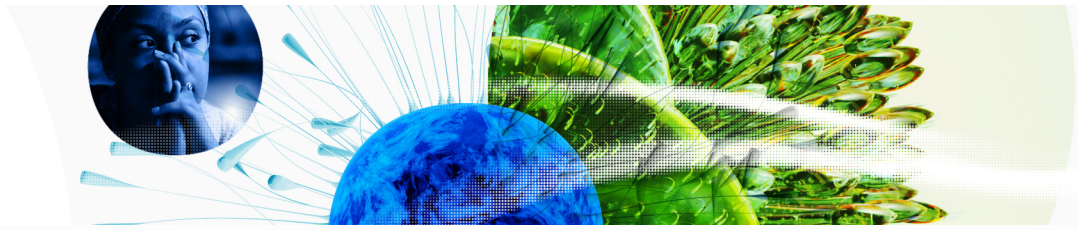


→ Data availability

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

> Serbia has missing data for seven indicators and outdated data for four indicators.

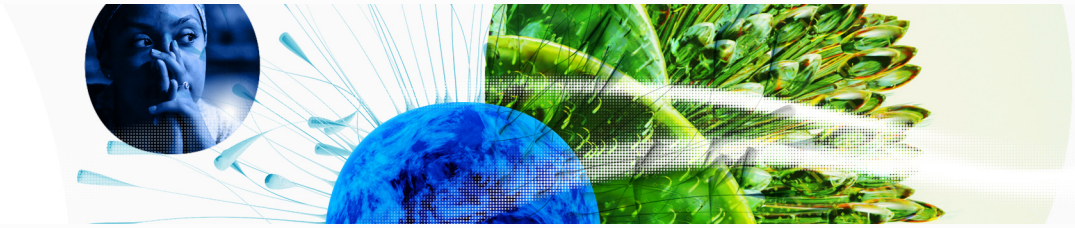
> Missing data for Serbia

Code	Indicator name	Economy Year	Model Year	Source
2.1.2	Government funding/pupil, secondary, % GDP/cap	n/a	2019	UNESCO Institute for Statistics
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
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 Serbia

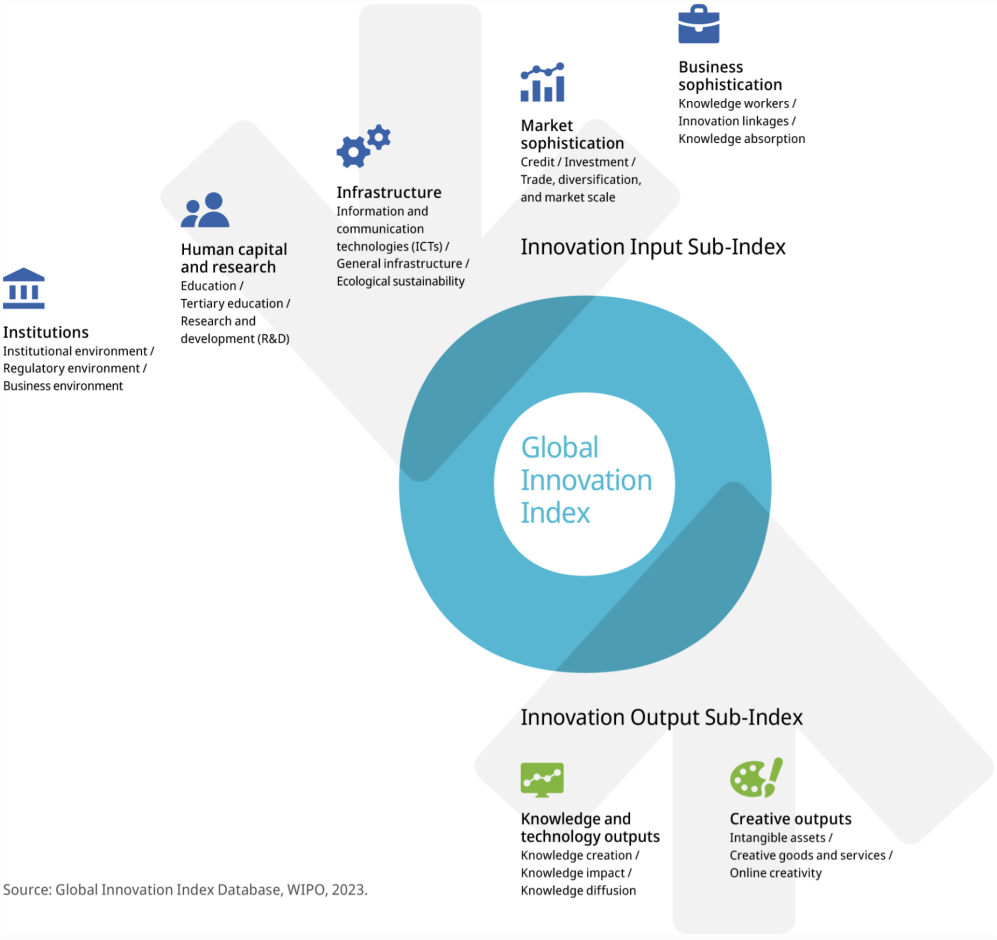
Code	Indicator name	Economy Year	Model Year	Source
2.1.1	Expenditure on education, % GDP	2019	2021	UNESCO Institute for Statistics
4.3.1	Applied tariff rate, weighted avg., %	2018	2020	World Bank
5.1.1	Knowledge-intensive employment, %	2021	2022	International Labour Organization
5.1.5	Females employed w/advanced degrees, %	2021	2022	International Labour 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.