GII 2022 at a glance

The Global Innovation Index 2022 captures the innovation ecosystem performance of 132 economies and tracks the most recent global innovation trends.

Global leaders in innovation in 2022

Top three innovation economies by region

Latin America and the Caribbean

1. **Chile**
2. **Brazil** ☆
3. **Mexico** ↓

Sub-Saharan Africa*

1. **South Africa**
2. **Botswana** ☆
3. **Kenya** ↓

Northern Africa and Western Asia†

1. **Israel**
2. **United Arab Emirates**
3. **Türkiye**

South East Asia, East Asia, and Oceania

1. **Republic of Korea**
2. **Singapore**
3. **China**

Northern America

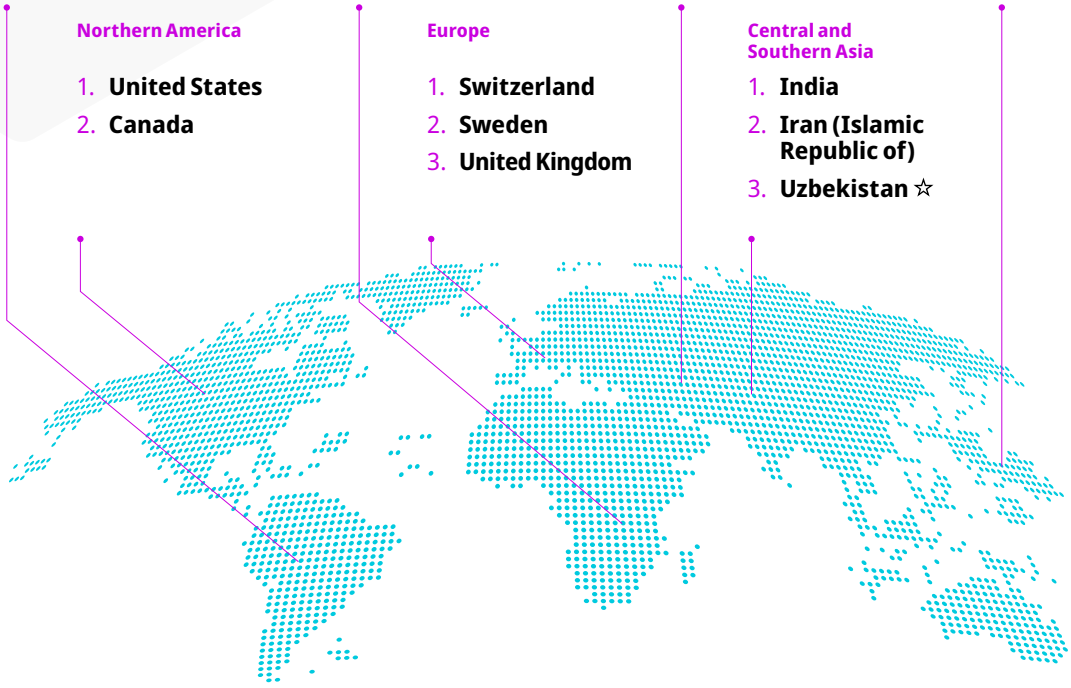
1. **United States**
2. **Canada**

Europe

1. **Switzerland**
2. **Sweden**
3. **United Kingdom**

Central and Southern Asia

1. **India**
2. **Iran (Islamic Republic of)**
3. **Uzbekistan** ☆



☆ Indicates a new entrant into the top three in 2022.

↑↓ Indicates the movement of rank (up or down) within the top three, relative to 2021.

* Top three in Sub-Saharan Africa (SSA) – excluding island economies. The top four in the region, including all economies, comprise Mauritius (1st), South Africa (2nd), Botswana (3rd) and Kenya (4th).

† Top three in Northern Africa and Western Asia (NAWA) – excluding island economies. The top four in the region, including all economies, are as follows: Israel (1st), Cyprus (2nd), United Arab Emirates (3rd) and Türkiye (4th).

Top three innovation economies by income group

High-income

1. **Switzerland**
2. **United States** ↑
3. **Sweden** ↓

Upper middle-income

1. **China**
2. **Bulgaria**
3. **Malaysia**

Lower middle-income

1. **India** ↑
2. **Viet Nam** ↓
3. **Iran (Islamic Republic of)** ☆

Low-income

1. **Rwanda**
2. **Madagascar** ☆
3. **Ethiopia** ☆

Source: Global Innovation Index Database, WIPO, 2022.

Notes: World Bank Income Group Classification (June 2021). Year-on-year GII rank changes are influenced by performance and methodological considerations; some economy data are incomplete (see Appendix I).

Global Innovation Index 2022 rankings

GII rank	Economy	Score	Income group rank	Region rank
1	Switzerland	64.6	1	1
2	United States	61.8	2	1
3	Sweden	61.6	3	2
4	United Kingdom	59.7	4	3
5	Netherlands	58.0	5	4
6	Republic of Korea	57.8	6	1
7	Singapore	57.3	7	2
8	Germany	57.2	8	5
9	Finland	56.9	9	6
10	Denmark	55.9	10	7
11	China	55.3	1	3
12	France	55.0	11	8
13	Japan	53.6	12	4
14	Hong Kong, China	51.8	13	5
15	Canada	50.8	14	2
16	Israel	50.2	15	1
17	Austria	50.2	16	9
18	Estonia	50.2	17	10
19	Luxembourg	49.8	18	11
20	Iceland	49.5	19	12
21	Malta	49.2	20	13
22	Norway	48.8	21	14
23	Ireland	48.5	22	15
24	New Zealand	47.2	23	6
25	Australia	47.1	24	7
26	Belgium	46.9	25	16
27	Cyprus	46.2	26	2
28	Italy	46.1	27	17
29	Spain	44.6	28	18
30	Czech Republic	42.8	29	19
31	United Arab Emirates	42.1	30	3
32	Portugal	42.1	31	20
33	Slovenia	40.6	32	21
34	Hungary	39.8	33	22
35	Bulgaria	39.5	2	23
36	Malaysia	38.7	3	8
37	Türkiye	38.1	4	4
38	Poland	37.5	34	24
39	Lithuania	37.3	35	25
40	India	36.6	1	1
41	Latvia	36.5	36	26
42	Croatia	35.6	37	27
43	Thailand	34.9	5	9
44	Greece	34.5	38	28
45	Mauritius	34.4	6	1
46	Slovakia	34.3	39	29
47	Russian Federation	34.3	7	30
48	Viet Nam	34.2	2	10
49	Romania	34.1	8	31
50	Chile	34.0	40	1
51	Saudi Arabia	33.4	41	5
52	Qatar	32.9	42	6
53	Iran (Islamic Republic of)	32.9	3	2
54	Brazil	32.5	9	2
55	Serbia	32.3	10	32
56	Republic of Moldova	31.1	11	33
57	Ukraine	31.0	4	34
58	Mexico	31.0	12	3
59	Philippines	30.7	5	11
60	Montenegro	30.3	13	35
61	South Africa	29.8	14	2
62	Kuwait	29.2	43	7
63	Colombia	29.2	15	4
64	Uruguay	29.2	44	5
65	Peru	29.1	16	6
66	North Macedonia	28.8	17	36
67	Morocco	28.8	6	8
68	Costa Rica	28.7	18	7
69	Argentina	28.6	19	8
70	Bosnia and Herzegovina	28.5	20	37
71	Mongolia	28.0	7	12
72	Bahrain	28.0	45	9
73	Tunisia	27.9	8	10
74	Georgia	27.9	21	11
75	Indonesia	27.9	9	13
76	Jamaica	27.7	22	9
77	Belarus	27.5	23	38
78	Jordan	27.4	24	12
79	Oman	26.8	46	13
80	Armenia	26.6	25	14
81	Panama	25.7	26	10
82	Uzbekistan	25.3	10	3
83	Kazakhstan	24.7	27	4
84	Albania	24.4	28	39
85	Sri Lanka	24.2	11	5
86	Botswana	23.9	29	3
87	Pakistan	23.0	12	6
88	Kenya	22.7	13	4
89	Egypt	22.7	14	15
90	Dominican Republic	22.7	30	11
91	Paraguay	22.7	31	12
92	Brunei Darussalam	22.2	47	14
93	Azerbaijan	21.5	32	16
94	Kyrgyzstan	21.1	15	7
95	Ghana	20.8	16	5
96	Namibia	20.6	33	6
97	Cambodia	20.5	17	15
98	Ecuador	20.3	34	13
99	Senegal	19.9	18	7
100	El Salvador	19.9	19	14
101	Trinidad and Tobago	19.8	48	15
102	Bangladesh	19.7	20	8
103	United Republic of Tanzania	19.4	21	8
104	Tajikistan	18.8	22	9
105	Rwanda	18.7	1	9
106	Madagascar	18.6	2	10
107	Zimbabwe	18.1	23	11
108	Nicaragua	18.1	24	16
109	Côte d'Ivoire	17.8	25	12
110	Guatemala	17.8	35	17
111	Nepal	17.6	26	10
112	Lao People's Democratic Republic	17.4	27	16
113	Honduras	17.3	28	18
114	Nigeria	16.9	29	13
115	Algeria	16.7	30	17
116	Myanmar	16.4	31	17
117	Ethiopia	16.3	3	14
118	Zambia	15.8	32	15
119	Uganda	15.7	4	16
120	Burkina Faso	15.3	5	17
121	Cameroon	15.1	33	18
122	Togo	15.1	6	19
123	Mozambique	15.0	7	20
124	Benin	14.6	34	21
125	Niger	14.6	8	22
126	Mali	14.2	9	23
127	Angola	13.9	35	24
128	Yemen	13.8	10	18
129	Mauritania	12.4	36	25
130	Burundi	12.3	11	26
131	Iraq	11.9	36	19
132	Guinea	11.6	12	27

High-income
Upper middle-income
Lower middle-income
Low-income

Europe
Northern America
Latin America and the Caribbean
South East Asia, East Asia, and Oceania
Central and Southern Asia
Northern Africa and Western Asia
Sub-Saharan Africa

Source: Global Innovation Index Database, WIPO, 2022.

Note: For an explanation of classifications, see Economy Profiles, note 1.

Innovation performance at different income levels, 2022

	High-income group	Upper middle-income group	Lower middle-income group	Low-income group
Performance above expectation for level of development	Switzerland United States Sweden United Kingdom Netherlands Republic of Korea Singapore Germany Finland Denmark France Japan Hong Kong, China Canada Israel Austria Estonia Luxembourg Iceland Malta Norway Ireland New Zealand Australia	China Bulgaria Thailand Brazil Republic of Moldova South Africa Peru Jamaica Jordan	India Viet Nam Iran (Islamic Republic of) Ukraine Philippines Morocco Mongolia Tunisia Indonesia Uzbekistan Pakistan Kenya United Republic of Tanzania Zimbabwe	Rwanda Madagascar Mozambique Burundi
Performance in line with level of development	Belgium Cyprus Italy Spain Czech Republic Portugal Slovenia Hungary Poland Latvia Croatia Chile	Malaysia Türkiye Mauritius Russian Federation Serbia Mexico Montenegro Colombia North Macedonia Costa Rica Bosnia and Herzegovina Georgia Armenia Albania	Sri Lanka Kyrgyzstan Ghana Cambodia Senegal Bangladesh Tajikistan Nepal	Ethiopia Uganda Burkina Faso Togo Niger Yemen
All other economies	United Arab Emirates Lithuania Greece Slovakia Saudi Arabia Qatar Kuwait Uruguay Bahrain Oman Brunei Darussalam Trinidad and Tobago	Romania Argentina Belarus Panama Kazakhstan Botswana Dominican Republic Paraguay Azerbaijan Namibia Ecuador Guatemala Iraq	Egypt El Salvador Nicaragua Côte d'Ivoire Lao People's Democratic Republic Honduras Nigeria Algeria Myanmar Zambia Cameroon Benin Angola Mauritania	Mali Guinea

Source: Global Innovation Index Database, WIPO, 2022.

Key takeaways

The GII 2022 tracks global innovation trends against the background of an ongoing pandemic, a slowing of productivity growth and other evolving challenges.

The state of innovation in turbulent times

1. Innovation investments thrived at the height of the COVID-19 pandemic and boomed in 2021, but their continued resilience is uncertain for 2022, as the world meets new challenges

Historic data, plus the global economic recession, would have led one to expect a prompt cutback in research and development (R&D), intellectual property (IP) filings and venture capital in 2020 and 2021. The opposite happened:

- Scientific articles published globally surpassed the 2 million mark for the first time in 2021.
- Investments in global R&D in 2020 grew at a rate of 3.3 percent, not falling, but slowing from the historically high 6.1 percent R&D growth rate recorded in 2019.
- Government budget allocations for the top R&D spending economies showed strong growth in 2020, as governments vigorously sought to mitigate the economic effects of the crisis on the future of innovation. For 2021 R&D budgets, the picture is more varied, with government spending having continued to grow in the Republic of Korea and Germany, but being cut by Japan and the United States.
- In turn, top corporate R&D spenders increased their R&D expenditure by more than 11 percent in 2020, and by almost 10 percent to over USD 900 billion in 2021, which is higher than in 2019 before the pandemic. This increase was primarily driven by four industries: ICT hardware and electrical equipment; Software and ICT services; Pharmaceuticals and biotechnology; and, Construction and industrial metals. Firms that cut R&D in 2020, including in sectors such as Automobiles; Industrial engineering and transportation; and Travel, generally – but not always – returned to R&D growth in 2021.
- IP filing activity grew during the global pandemic in 2020 and in 2021, too. International trademark filings – a good proxy for entrepreneurship – saw particularly strong growth in 2021, up by 15 percent.
- The biggest boom was in venture capital (VC). VC deals grew by 46 percent in 2021, recording levels comparable to the internet boom years of the late 1990s. What is more, VC has become more inclusive, with the Latin America and the Caribbean and Africa regions witnessing the strongest VC growth, albeit from a low base. The VC outlook for 2022 is more sober; tightening monetary policies and the knock-on effect on risk capital will lead to a deceleration in VC.

2. Technological progress, adoption and innovation's socioeconomic impact all show signs of weakness – the future of innovation-driven growth is at stake

- Indicators of *technological progress* in the fields of semiconductor speed, electric battery prices, the cost of renewable energy (with the exception of wind) and drug approvals in the United States – the best proxy to hand – show a slowdown from long-term trends.
- *Technology adoption*, in turn, is progressing, with growth across a variety of technologies analyzed, in particular electric vehicles. However, penetration rates are still medium-to-low, with the exception of mobile broadband, which is now within reach of the vast majority of people worldwide.
- Largely due to COVID-19's short-term influence, the *socioeconomic impact of innovation* seems to be at a low point. All proxies for innovation impact are experiencing a significant slowdown. Today, productivity growth – the metric used by economists to gauge whether living standards can be improved over time – is at its lowest level ever. What has been called the period of Great Stagnation brings into question the ability of innovation to create future growth.
- The thematic focus of this year's 2022 report considers this sober outlook and asks: "What is the future of innovation-driven growth?" and "Who is right?". Is it the innovation pessimists, who argue that low productivity growth is here to stay. According to them, innovations that make a truly transformative impact on productivity – like some of the key inventions of previous centuries such as electricity – are just too difficult to find these days. Or is it the innovation optimists, who predict a new economic and social era; one where a massive new innovation spurt fosters a productivity uplift.

- Taking the view of the optimists, the GII 2022 puts its hopes in two novel innovation waves:
  1. an upcoming **Digital Age innovation wave** built on supercomputing, artificial intelligence and automation that is on the verge of making ample productivity impacts across all sectors – including services – and helping to achieve scientific breakthroughs in basic sciences of all fields; and
  2. a **Deep Science innovation wave** built on breakthroughs in biotechnologies, nanotechnologies, new materials and other sciences that is revolutionizing innovations in four fields of key importance to society: health, food, environment, and mobility.

That said, the positive effects of these two novel waves will take a long time to materialize. Many obstacles, particularly in the area of technology adoption and diffusion, have to be overcome first.

On balance, if the Digital Age and Deep Science innovation waves can be deployed effectively, and if governments address the urgent matters discussed in the GII 2022 Special theme section, then innovation-driven productivity growth and its effect on our well-being will be high.

Results of the *Global Innovation Index 2022* rankings

3. Some key changes in the top 15 GII ranking; China, Türkiye and India consolidate their position as global innovation powerhouses; Indonesia next up?

- Switzerland – for the 12th year in a row – ranks first in the GII 2022. The United States climbs to 2nd position.
- Then comes Sweden, which is followed, in turn, by the United Kingdom, the Netherlands and the Republic of Korea.
- China moves up to 11th place, overtaking France; for now, it firmly remains the only middle-income economy within the GII top 30. No change to China's exceptional position among middle-income economies is currently in sight, unless Türkiye further progresses fast.
- Canada is back among the top 15 global innovators, climbing to 15th place.
- South East Asia, East Asia, and Oceania (SEAO) is the only region closing the gap on Northern America and Europe. Two SEAO economies are among the top 10 global innovators: the Republic of Korea (6th) and Singapore (rising to rank 7th place).
- Türkiye (37th) and India (40th) enter the top 40 for the first time.
- Beyond China and India, Viet Nam (48th), the Islamic Republic of Iran (53rd) and the Philippines (59th) are the middle-income economies with the fastest innovation catch-up to-date, although Viet Nam and the Philippines fell back slightly, underlining the importance of sustaining innovation effort over time. Indonesia (75th), in its turn, shows promising innovation potential.
- The top economies within the Northern Africa and Western Asia region are Israel (16th), the United Arab Emirates (31st and edging closer to the top 30) and Türkiye.
- India, the Islamic Republic of Iran and – for the first time – Uzbekistan (82nd) and Pakistan (87th) lead the Central and Southern Asia region.
- Chile (50th) – the only Latin American country in the top 50 – leads the Latin America and Caribbean region, followed by Brazil (54th) – a newcomer to the region's top 3 – then Mexico (58th), with Costa Rica dropping out of the top 3 for the region (68th). Colombia (63rd), Peru (65th), Argentina (69th) and the Dominican Republic (90th) all see substantial rank increases in the GII 2022.
- Mauritius (45th) and South Africa (61st) lead the Sub-Sahara Africa region, followed by newcomer to the regional top 3 Botswana (86th) and then Kenya (88th). Beyond Mauritius and Botswana, Ghana (95th), Namibia (96th), Senegal (99th), Zimbabwe (107th), Ethiopia (117th) and Angola (127th) jump forward.

4. Several developing economies are performing above expectation on innovation relative to their level of economic development

- In the GII 2022, 26 countries are outperforming on innovation relative to their development, including newcomers Indonesia, Uzbekistan and Pakistan.
- India, Kenya, the Republic of Moldova and Viet Nam hold the record by outperforming for the 12th year in a row.
- Of the 26 outperformers on innovation, eight are from Sub-Saharan Africa, with Kenya, Rwanda and Mozambique in the lead.
- In Latin America and the Caribbean, Brazil, Peru and Jamaica are outperforming relative to development.

5. China now has the same amount of global top S&T clusters as the United States

- In 2022 – as in previous years – the top 100 science and technology (S&T) clusters are concentrated in three regions – Northern America, Europe and Asia – and in two countries especially: China and the United States.
- Tokyo–Yokohama (Japan) is the top global S&T cluster, followed by Shenzhen–Hong Kong–Guangzhou (China and Hong Kong, China), Beijing (China), Seoul (Republic of Korea) and San Jose–San Francisco (United States).
- Cambridge in the United Kingdom and Eindhoven in the Netherlands/Belgium are found to be the most S&T-intensive clusters. Daejeon (Republic of Korea), San Jose–San Francisco (United States) and Oxford (United Kingdom) follow.
- For the first time, China has as many top 100 S&T clusters as the United States. Germany follows with 10 clusters, headed by Cologne and Munich, and Japan with five clusters, with Tokyo–Yokohama and Osaka–Kobe–Kyoto in the lead.
- São Paulo (Brazil); Bengaluru, Delhi and Mumbai and – new – Chennai (India); Tehran (Islamic Republic of Iran); Istanbul and Ankara (Türkiye); and Moscow (Russian Federation) are the only clusters from middle-income economies beyond China. Ankara and Istanbul (Türkiye) and Mumbai (India) have increased their ranking considerably.
- The GII 2022 also identifies clusters beyond the top 100. Among middle-income economies, Argentina, Egypt, Malaysia, Mexico and Thailand host S&T clusters, respectively, Buenos Aires, Cairo, Kuala Lumpur, Mexico City and Bangkok. Other prominent Latin American urban areas – such as Mexico City, Rio de Janeiro, Porto Alegre and Santiago de Chile – also feature in this extended global S&T clusters top ranking.