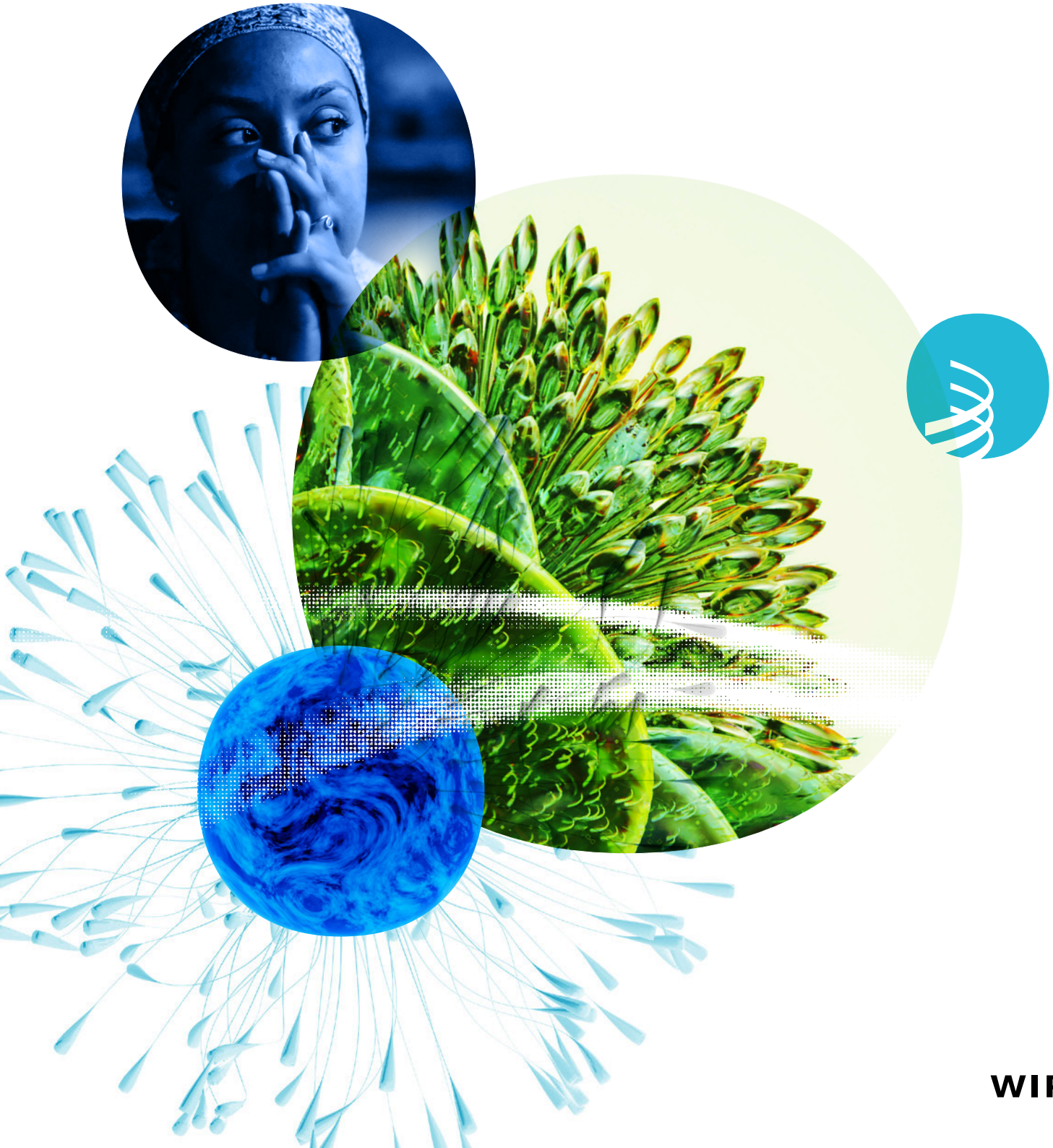
Executive Summary
Global Innovation Index 2023



WIPO

Despite all the uncertainties we are currently facing, future advances in artificial intelligence, energy, medicine and transport are in sight. WIPO will continue to support all Member States to pursue innovation-led growth so that the resulting new scientific breakthroughs and innovations can reach everyone and work for us all.

Daren Tang, Director General,
World Intellectual Property Organization (WIPO)

GII 2023 at a glance

The Global Innovation Index 2023 captures the innovation ecosystem performance of 132 economies and tracks the most recent global innovation trends.

Global leaders in innovation 2023

Top three innovation economies by region

Latin America and the Caribbean

1. Brazil ↑
2. Chile ↓
3. Mexico

Sub-Saharan Africa*

1. South Africa
2. Botswana
3. Senegal ☆

Northern Africa and Western Asia†

1. Israel
2. United Arab Emirates
3. Türkiye

South East Asia, East Asia, and Oceania

1. Singapore ↑
2. Republic of Korea ↓
3. China

Northern America

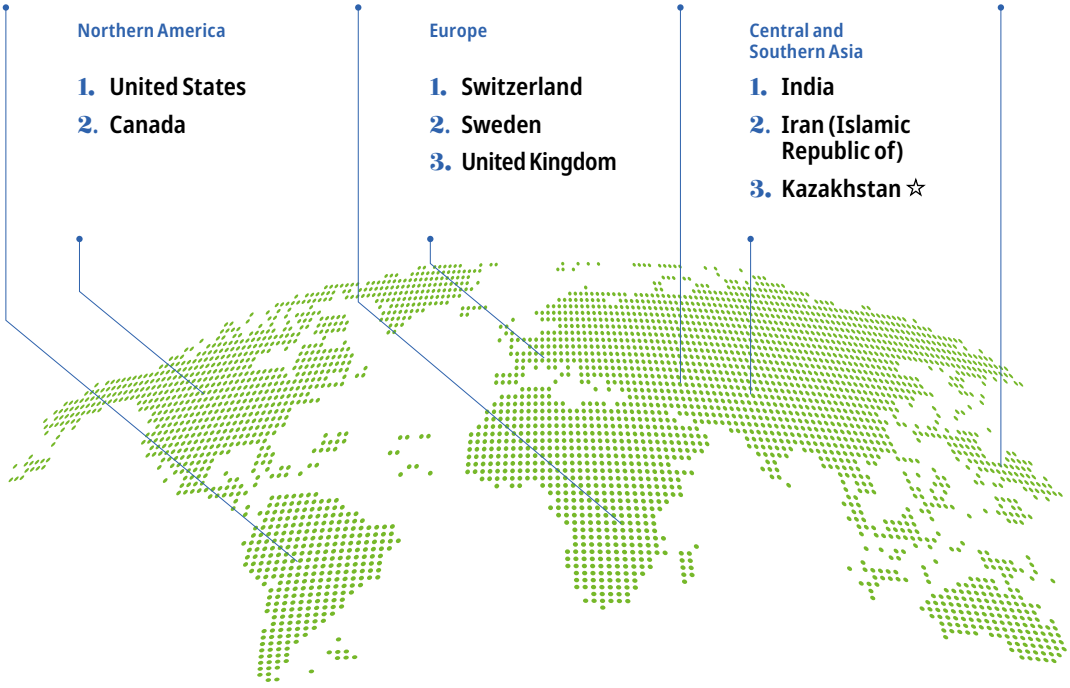
1. United States
2. Canada

Europe

1. Switzerland
2. Sweden
3. United Kingdom

Central and Southern Asia

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



☆ Indicates a new entrant into the top three in 2023.

↑↓ Indicates movement in ranking (up or down) within the top three, relative to 2022.

* Top three in Sub-Saharan Africa (SSA) – excluding island economies. The top five within the region, including all economies, comprise Mauritius (1st), South Africa (2nd), Botswana (3rd), Cabo Verde (4th) and Senegal (5th).

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

Top three innovation economies by income group

High-income

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

Upper middle-income

1. China
2. Malaysia ↑
3. Bulgaria ↓

Lower middle-income

1. India
2. Viet Nam
3. Ukraine ☆

Low-income

1. Rwanda
2. Madagascar
3. Togo ☆

Source: Global Innovation Index Database, WIPO, 2023.

Notes: World Bank Income Group Classification (July 2022). Year-on-year changes in GII rank are influenced by performance and methodological considerations. Some economy data are incomplete (see Appendix I).

Global Innovation Index 2023 rankings

GII rank	Economy	Score	Income group rank	Region rank
1	Switzerland	67.6	1	1
2	Sweden	64.2	2	2
3	United States	63.5	3	1
4	United Kingdom	62.4	4	3
5	Singapore	61.5	5	1
6	Finland	61.2	6	4
7	Netherlands (Kingdom of the)	60.4	7	5
8	Germany	58.8	8	6
9	Denmark	58.7	9	7
10	Republic of Korea	58.6	10	2
11	France	56.0	11	8
12	China	55.3	1	3
13	Japan	54.6	12	4
14	Israel	54.3	13	1
15	Canada	53.8	14	2
16	Estonia	53.4	15	9
17	Hong Kong, China	53.3	16	5
18	Austria	53.2	17	10
19	Norway	50.7	18	11
20	Iceland	50.7	19	12
21	Luxembourg	50.6	20	13
22	Ireland	50.4	21	14
23	Belgium	49.9	22	15
24	Australia	49.7	23	6
25	Malta	49.1	24	16
26	Italy	46.6	25	17
27	New Zealand	46.6	26	7
28	Cyprus	46.3	27	2
29	Spain	45.9	28	18
30	Portugal	44.9	29	19
31	Czech Republic	44.8	30	20
32	United Arab Emirates	43.2	31	3
33	Slovenia	42.2	32	21
34	Lithuania	42.0	33	22
35	Hungary	41.3	34	23
36	Malaysia	40.9	2	8
37	Latvia	39.7	35	24
38	Bulgaria	39.0	3	25
39	Türkiye	38.6	4	4
40	India	38.1	1	1
41	Poland	37.7	36	26
42	Greece	37.5	37	27
43	Thailand	37.1	5	9
44	Croatia	37.1	38	28
45	Slovakia	36.2	39	29
46	Viet Nam	36.0	2	10
47	Romania	34.7	40	30
48	Saudi Arabia	34.5	41	5
49	Brazil	33.6	6	1
50	Qatar	33.4	42	6
51	Russian Federation	33.3	7	31
52	Chile	33.3	43	2
53	Serbia	33.1	8	32
54	North Macedonia	33.0	9	33
55	Ukraine	32.8	3	34
56	Philippines	32.2	4	11
57	Mauritius	32.1	10	1
58	Mexico	31.0	11	3
59	South Africa	30.4	12	2
60	Republic of Moldova	30.3	13	35
61	Indonesia	30.3	5	12
62	Iran (Islamic Republic of)	30.1	6	2
63	Uruguay	30.0	44	4
64	Kuwait	29.9	45	7
65	Georgia	29.9	14	8
66	Colombia	29.4	15	5
67	Bahrain	29.1	46	9
68	Mongolia	28.8	7	13
69	Oman	28.4	47	10
70	Morocco	28.4	8	11
71	Jordan	28.2	16	12
72	Armenia	28.0	17	13
73	Argentina	28.0	18	6
74	Costa Rica	27.9	19	7
75	Montenegro	27.8	20	36
76	Peru	27.7	21	8
77	Bosnia and Herzegovina	27.1	22	37
78	Jamaica	27.1	23	9
79	Tunisia	26.9	9	14
80	Belarus	26.8	24	38
81	Kazakhstan	26.7	25	3
82	Uzbekistan	26.2	10	4
83	Albania	25.4	26	39
84	Panama	25.3	48	10
85	Botswana	24.6	27	3
86	Egypt	24.2	11	15
87	Brunei Darussalam	23.5	49	14
88	Pakistan	23.3	12	5
89	Azerbaijan	23.3	28	16
90	Sri Lanka	23.3	13	6
91	Cabo Verde	23.3	14	4
92	Lebanon	23.2	15	17
93	Senegal	22.5	16	5
94	Dominican Republic	22.4	29	11
95	El Salvador	21.8	17	12
96	Namibia	21.8	30	6
97	Bolivia (Plurinational State of)	21.4	18	13
98	Paraguay	21.4	31	14
99	Ghana	21.3	19	7
100	Kenya	21.2	20	8
101	Cambodia	20.8	21	15
102	Trinidad and Tobago	20.7	50	15
103	Rwanda	20.6	1	9
104	Ecuador	20.5	32	16
105	Bangladesh	20.2	22	7
106	Kyrgyzstan	20.2	23	8
107	Madagascar	19.1	2	10
108	Nepal	18.8	24	9
109	Nigeria	18.4	25	11
110	Lao People's Democratic Republic	18.3	26	16
111	Tajikistan	18.3	27	10
112	Côte d'Ivoire	18.2	28	12
113	United Republic of Tanzania	17.4	29	13
114	Togo	16.9	3	14
115	Nicaragua	16.9	30	17
116	Honduras	16.7	31	18
117	Zimbabwe	16.5	32	15
118	Zambia	16.4	4	16
119	Algeria	16.1	33	18
120	Benin	16.0	34	17
121	Uganda	16.0	5	18
122	Guatemala	15.8	33	19
123	Cameroon	15.3	35	19
124	Burkina Faso	14.5	6	20
125	Ethiopia	14.3	7	21
126	Mozambique	13.6	8	22
127	Mauritania	13.5	36	23
128	Guinea	13.3	9	24
129	Mali	12.9	10	25
130	Burundi	12.5	11	26
131	Niger	12.4	12	27
132	Angola	10.3	37	28

Source: Global Innovation Index Database, WIPO, 2023.

Note: For an explanation of classifications, see Economy profiles, endnote 1.

- 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
- Northern Africa and Western Asia
- Sub-Saharan Africa
- Central and Southern Asia

Innovation performance at different income levels, 2023

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

Source: Global Innovation Index Database, WIPO, 2023.

Global Innovation Tracker Dashboard

Science and innovation investment

	Scientific publications	R&D investments		Venture capital		International patent filings
		Global total	Top corporate R&D spenders	Deal numbers	Deal values	
Short term	1.5% 2021 → 2022	5.2% 2020 → 2021	7.4% 2021 → 2022	17.6% 2021 → 2022	−37.8% 2021 → 2022	0.3% 2021 → 2022
Long term (annual growth)	4.9% 2012 → 2022	4.8% 2011 → 2021	n.a.	9.9% 2012 → 2022	20.6% 2012 → 2022	3.6% 2012 → 2022

Technological progress

	Computing power		Costs of renewable energy		Electric battery price	Cost of genome sequencing	Drug approvals
	Moore's Law	Green supercomputers	Solar photovoltaic	Wind			
Short term	54.6% 2021 → 2022	54.3% 2021 → 2022	−12.8% 2020 → 2021	−13.2% 2020 → 2021	7.1% 2021 → 2022	−23.3%* 2021 → 2022	−26.0% 2021 → 2022
Long term (annual growth)	43.7% 2012 → 2022	35.4% 2013 → 2022	−17.0% 2011 → 2021	−9.6% 2011 → 2021	−15.3% 2012 → 2022	−22.3%* 2012 → 2022	−0.5% 2012 → 2022

Technology adoption

	Safe sanitation	Connectivity		Robots	Electric vehicles	Cancer radiotherapy
		Fixed broadband	Mobile broadband			
Short term	1.4% 2021 → 2022	4.8% 2021 → 2022	6.0% 2021 → 2022	14.6% 2020 → 2021	59.9% 2021 → 2022	−1.4% 2020 → 2022
Long term (annual growth)	2.4% 2012 → 2022	6.7% 2012 → 2022	14.8% 2012 → 2022	11.7% 2011 → 2021	63.5% 2012 → 2022	−1.3% 2012 → 2022
Penetration	57 of 100 inhabitants in 2022 (45 in 2012)	17.6 per 100 inhabitants in 2022 (16.8 in 2021)	86.9 per 100 inhabitants in 2022 (82.0 in 2021)	n.a.	2.1 of 100 cars in 2022 (1.3 in 2021)	20.9 of 100 countries in 2022 (21.5 in 2020)

Socioeconomic impact

	Labor productivity	Life expectancy	Carbon dioxide emissions	
Short term	0.0% 2021 → 2022	−1.3% 2020 → 2021	5.3% 2020 → 2021	1.7%* 2021 → 2022
Long term (annual growth)	2.2% 2012 → 2022	0.0% 2011 → 2021		0.7% 2011 → 2021

Notes: See Data notes at the end of this section for a definition of indicators and their data sources. Long-term annual growth refers to the compound annual growth rate (CAGR) over the indicated period. Historical data may have been updated and could differ from last year's Global Innovation Tracker. Estimates or incomplete data are indicated by an asterisk (*). n.a. indicates not available.

Key takeaways

The GII 2023 tracks global innovation trends against a background of uncertainty caused by slow economic recovery from the COVID-19 pandemic, high interest rates and geopolitical conflict, but with the promise of Digital Age and Deep Science innovation waves and technological progress.

Results of the Global Innovation Tracker 2023

1. Innovation investments showed a mixed performance in 2022 within a context of many challenges and a downturn in innovation finance. The outlook for 2023 and 2024 is uncertain.

After a boom in 2021, investments in innovation showed a mixed performance in 2022. Scientific publications, R&D, venture capital (VC) deals and patents continued to increase to higher than ever. However, growth rates were lower than the exceptional increases seen in 2021. In addition, the value of VC investment declined and international patent filings stagnated in 2022.

- Scientific publications grew moderately in 2022 by 1.5 percent to around 2 million articles, as health- and COVID-related research, which caused a boom in 2021, slowed.
- Global R&D grew strongly at a rate of 5.2 percent in 2021 – close to pre-pandemic growth in 2019; business R&D grew strongly by 7 percent – a rate unseen since 2014. Data for 2022 are not yet available.
- Global government R&D budgets are expected to have grown in real terms in 2022. Significant increases in real 2022 budgets were planned for Japan and the Republic of Korea, and a smaller one for Germany, making up for cuts in R&D budgets in 2022 by other top R&D spending governments such the United States.
- Worldwide R&D expenditure by the highest R&D spending corporations reached USD 1.1 trillion in 2022 – a historic high. Top corporate R&D spenders increased expenditure nominally by around 7.4 percent in 2022 (down from 15 percent growth in 2021). Yet, it is hard to assess whether this nominal growth compensated for surging inflation. On a positive note, the ratio of R&D expenditure to revenue is on par with 2021 and at pre-pandemic level – meaning corporations are just as R&D-intensive as ever.
- Reflecting a deteriorating climate for risk finance, the value of VC investments declined sharply in 2022 from an exceptionally high level in 2021. Nevertheless, the number of VC deals still grew healthily in 2022 by close to 17.6 percent – reflecting activity that remained strong in the first half of the year. Asia Pacific is now, for the first time, on par with Northern America in terms of deal activity. However, total VC value fell sharply in 2022 by close to 40 percent. The only region not to see a decline in dollars invested was Africa, albeit at low levels. All in all, the VC outlook for 2023 and 2024 is uncertain, with tighter monetary conditions likely to continue impacting innovation finance.
- International patent filings stagnated in 2022 (0.3 percent growth), recording the slowest rate of increase since 2009, but still achieving a record of around 280,000 filings.

2. Technological progress is rampant, without many setbacks; technology adoption is growing, but the socioeconomic impact remains weak

- Indicators of *technological progress* in the fields of information technology, health and energy continue to show progress – the Digital Age and Deep Science innovation waves outlined in GII 2022 are well underway. Supercomputers are becoming faster and more energy efficient. The cost of genome sequencing and low-emission energy technologies, such as wind and solar power, are decreasing. Due to the price volatility of required inputs, the cost of electric batteries rose sharply in 2022, although the long-term trend is still downward. Having peaked in 2020, drug approvals in the United States fell in 2022 for the second year in a row.
- With one exception, *technology adoption* is developing positively: safe sanitation, connectivity, robots and electric vehicles are now more widespread, even though penetration for some technologies remains low (e.g., electric vehicles). The adoption of radiotherapy for cancer treatment also remains inadequate in many countries.
- The *socioeconomic impact* of innovation continues to be at a low point for the second year in a row, in part due to the short-term impact of COVID-19. Labor productivity is currently at a standstill. Life expectancy fell for a second consecutive year, while the increase in healthy

life expectancy slowed. Carbon dioxide emissions rose strongly in 2021, but less so in 2022. Although the first four months of 2023 point to only a modest rise, CO_2 emissions continue to increase. If this trend persists, there is no global reduction in CO_2 emissions on the horizon.

Results of the Global Innovation Index 2023 rankings

The GII 2023 is unique in incorporating a significant amount of data from the pandemic and post-pandemic years. Country-specific policy responses to the pandemic, including differences in lockdowns, but also more recently the effects of armed conflict, have inevitably had a multifaceted effect on the innovation rankings that requires close scrutiny.

3. Switzerland, Sweden, the United States, the United Kingdom and Singapore lead; China, Türkiye, India, Viet Nam, the Philippines, Indonesia and the Islamic Republic of Iran are the middle-income economies making most headway in innovation over the last decade

- Switzerland – for a 13th year – ranks first in the GII 2023. Sweden is now 2nd and the United States 3rd, followed by the United Kingdom (4th) and Singapore (5th), which enters the top 5.
- Finland (6th) moves closer to the top 5, and every other Nordic (Denmark 9th and Sweden) and Baltic (Estonia, 16th, Lithuania 34th and Latvia 37th) economy is also on an upward trend, except for Iceland, which stays stable at 20th position.
- China – still the sole middle-income economy within the GII top 30, having entered the top echelon in 2014 – is ranked 12th in GII2023, while Japan is 13th.
- Israel (14th) makes it into the top 15.
- Saudi Arabia (48th), Brazil (49th) and Qatar (50th) make it into the top 50, and South Africa (59th) into the top 60.
- Indonesia (61st) joins China, Türkiye (39th), India (40th), Viet Nam (46th), the Philippines (56th), and the Islamic Republic of Iran (62nd) in the group of middle-income economies within the GII top 65. This is the group that has climbed the GII rankings fastest over the last decade.
- Outside the top 65 but within the top 100, the following middle- and low-income countries have progressed the most – by more than 20 ranks – within the last decade: Morocco (70th), Uzbekistan (82nd), Egypt (86th) and Pakistan (88th).
- In the last four years, and since the pandemic started, Mauritius (57th), Indonesia, Saudi Arabia, Brazil and Pakistan have risen the most in rank (in order of rank progression).

4. The United States, Singapore and Israel are scoring best in particular innovation indicators

- The United States continues to lead in terms of the number of GII innovation indicators in which it ranks top globally (13 out of 80 indicators).
- Singapore (11 out of 80) and Israel (9 out of 80) follow.
- Select middle- and low-income economies excel in various domains. Relative to other countries and their GDP or population, Mozambique ranks 1st in Gross capital formation, Cambodia and Nepal in Loans from microfinance institutions, Mauritius in Venture capital investors, and the Islamic Republic of Iran in Trademarks.

5. Regional GII leaders are Switzerland, the United States, Brazil, India, Singapore, Israel and Mauritius; India and Rwanda lead their income groups.

- In South East Asia, East Asia and Oceania, Singapore, the Republic of Korea (10th) and China lead.
- In Northern Africa and Western Asia, Israel leads and is followed by Cyprus (28th), the United Arab Emirates (UAE) (32nd) and Türkiye.
- In Latin America and the Caribbean, Brazil leads for the first time, followed by Chile (52nd) and Mexico (58th).
- In Central and Southern Asia, India continues to lead, and the Islamic Republic of Iran (62nd) and Kazakhstan (81st, a newcomer to the region's top 3) come next.
- In Sub-Saharan Africa, Mauritius (57th) is followed by South Africa (59th), Botswana (85th), Cabo verde (91st) and Senegal (93rd).
- India leads the lower middle-income group, followed by Viet Nam and Ukraine (55th). Ukraine is a newcomer to this income group's top 3, based on data that mostly predate 2022.
- Rwanda (103rd) leads the low-income group, followed by Madagascar (107th) and Togo (114th), a newcomer to this income group's top 3.

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

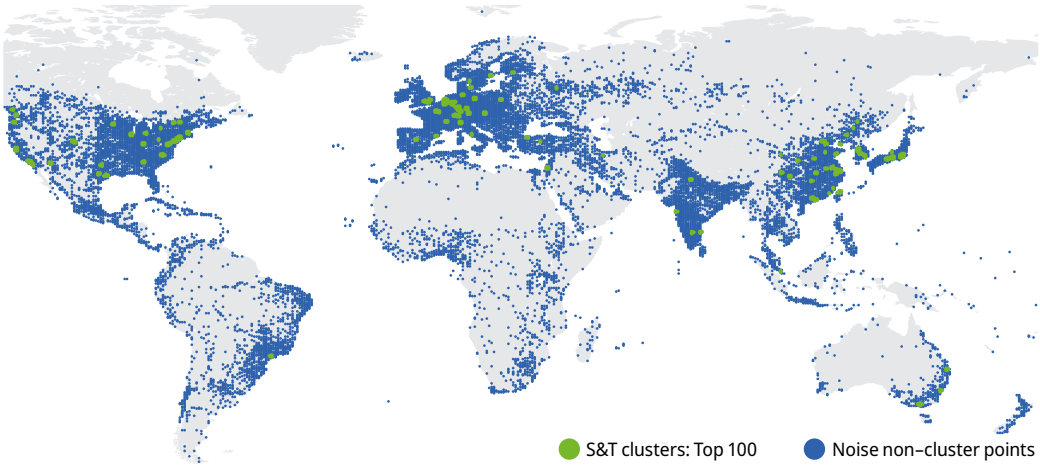
- A total of 21 economies outperform on innovation relative to level of development, the majority located in Sub-Saharan Africa and South East Asia, East Asia, and Oceania.
- India, the Republic of Moldova (60th) and Viet Nam continue as record holders by being innovation overperformers for a 13th consecutive year.
- Indonesia, Uzbekistan and Pakistan keep their overperformer status for a second consecutive year, Brazil for a third.
- There are two notable comebacks in 2023, namely, Senegal and North Macedonia (54th).
- Conversely, 37 economies performed below expectation on innovation, the majority from Latin America and the Caribbean (11), followed by Sub-Saharan Africa (9), Northern Africa and Western Asia (8) and Europe (6).

Results of the global top 100 S&T cluster ranking

7. The world's five biggest science and technology clusters are all located in East Asia; Tokyo–Yokohama is the biggest S&T cluster globally, Cambridge the most S&T-intensive

- Tokyo–Yokohama (Japan) continues to lead, followed by Shenzhen–Hong Kong–Guangzhou (China and Hong Kong, China), Seoul (Republic of Korea) and then China's Beijing and Shanghai–Suzhou clusters.
- Cambridge in the United Kingdom and San Jose–San Francisco, CA, in the United States are the two most S&T-intensive clusters relative to population density. Oxford (United Kingdom), Eindhoven (Kingdom of the Netherlands) and Boston–Cambridge, MA (United States) follow. In Germany, Munich makes the top 10 most S&T-intensive clusters globally.
- For a first time, China tops the list of countries with the highest number of clusters among the top 100, having 24 in total. The United States follows, with 21 clusters, then Germany with nine.
- São Paulo (Brazil); Bengaluru, Delhi, Chennai and Mumbai (India); Tehran (Islamic Republic of Iran); Istanbul and Ankara (Türkiye); and Moscow (Russian Federation) are the only middle-income economy clusters outside China. Chennai and Bengaluru (India) see the biggest jump in ranking among this income group.

Top S&T cluster by economy or cross-border region ranked among the top 100, 2023

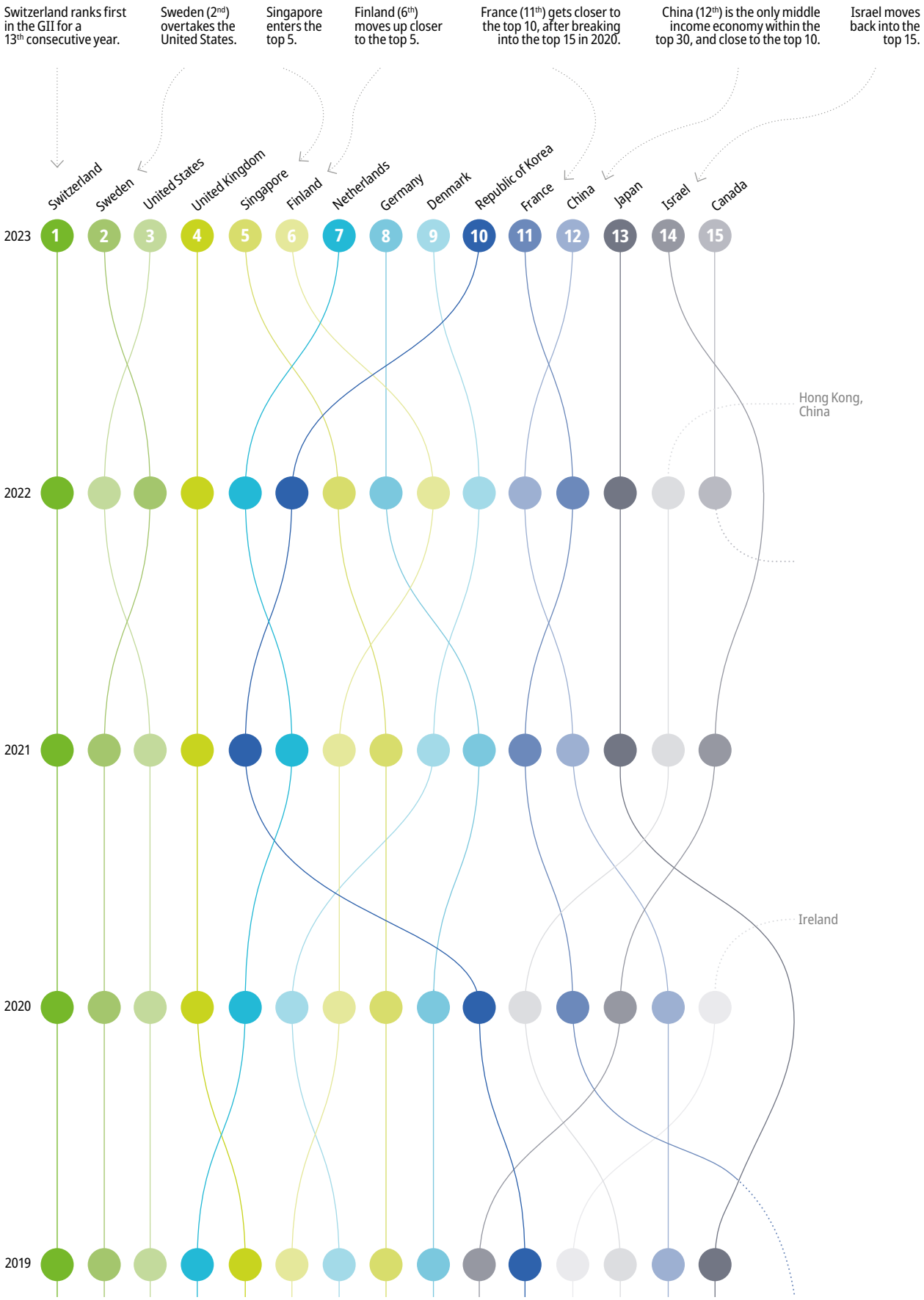


GII 2023 results

The GII unveils the world's innovation leaders, gauging the innovation performance of 132 economies.

Figure 1 Key global innovation changers 2023

The GII dynamo: The top 15 innovators, 2020–2023



Source: Global Innovation Index Database, WIPO, 2023.

Note: Year-on-year comparisons of GII rankings need to take into account changes to the GII model that have occurred over time, as well as data availability.

This section presents the highlights of the *Global Innovation Index 2023* (GII) ranking, including a discussion on the top ranked economies by income group and world region, as well as identifying those economies overperforming on innovation relative to level of development.

Appendix I provides details on how to interpret the results, cautioning against a strict year-on-year comparison of GII rankings.

It is important to note that the GII 2023 is unique, because it incorporates a significant amount of data from the pandemic and post-pandemic years. Approximately 88 percent of the data points used to construct the GII 2023 rankings cover the 2020–2023 period. Specifically, a majority of the data points are from 2021 (34 percent) and 2022 data (35 percent). This extensive use of COVID-19 pandemic-era data, together with the associated country-specific policy responses, including differences in lockdown and reopening periods, as well as the more recent impacts of armed conflict in Ukraine, has multifaceted effects on the rankings, so also the related country-specific swings in gross domestic product (GDP) – the scaling factor for a number of variables. These factors need to be considered carefully when evaluating GII 2023 rank shifts.

Innovation leaders in 2023

Switzerland continues to be the uncontested innovation world champion, Singapore makes the top five, and Indonesia joins China, Türkiye, India, the Islamic Republic of Iran and Viet Nam as most impressive innovation climbers of the last decade

For a 13th consecutive year, Switzerland ranks first in the GII (Figure 1). It is the global leader in innovation outputs, ranking first in both Knowledge and technology outputs and Creative outputs. Sweden overtakes the United States (US) to climb to second position. Sweden leads in Business sophistication (1st), Infrastructure (2nd) and Human capital and research (3rd). It holds top positions for its Researchers (1st) and its Knowledge-intensive employment (3rd). The United States continues to head the league table of scoring best in the world in 13 of the 80 GII 2023 innovation indicators (Box 1). It is number one in the world in indicators that include Global corporate R&D investors, Venture capital received, the quality of its universities, the combined valuation of its unicorn companies (a new GII indicator – Box 3), software spending and the value of corporate Intangible asset intensity.

Singapore enters the top five, and takes the leading position among South East Asia, East Asia and Oceania (SEAO) region economies. Finland (6th) gets closer to the top five, gaining three ranks this year. It comes top worldwide in Infrastructure (1st).

Denmark (9th) and the Republic of Korea (10th) remain in the top 10. France (11th) gets closer, improving one rank this year, while Japan remains strong as the 13th most innovative economy. Israel re-enters the top 15, reaching 14th place.

After a rapid ascent, gaining 23 positions over the last decade, China ranks 12th this year, dropping one rank relative to 2022.[1] China remains the sole middle-income economy to secure a position among the top 30, retaining 3rd place in the SEAO region and top spot in the upper middle-income group (see Figure 2 and Table 1). Belgium (23rd) re-enters the top 25, climbing three ranks.

All eight Nordic and Baltic economies improved their ranking this year, except for Iceland, which stays at 20th spot. Estonia gains two ranks and edges the top 15, at 16th place. Norway (19th) re-enters the top 20. Lithuania (34th) and Latvia (37th) make the largest improvements, gaining five and four ranks respectively, with Latvia re-entering the top 40.

Apart from China, there are only four other middle-income economies among the top 40 economies, namely, Malaysia (36th), Bulgaria (38th), Türkiye (39th) and India (40th).

Figure 1 Continued

Breaking barriers:
Economies soaring to new heights in innovation, 2023

Top 70
Georgia (65th), **Bahrain** (67th), **Mongolia** (68th) and **Oman** (69th) join the top 70.

Top 60
North Macedonia (54th) and **South Africa** (59th) make it into the top 60.

Top 50
Saudi Arabia (48th), **Brazil** (49th) and **Qatar** (50th) make it into to the top 50.

Top 40
Latvia (37th) makes it into top 40.

Top 30
Portugal (30th) joins the top 30.

Top 20
Norway (19th) makes it into the top 20 in 2023.

Top climbers of the decade, 2013–2023

2023
62nd **Top 70** Iran (Islamic Republic of)

2013
113th **Other** Iran (Islamic Republic of)

61st **Top 60** Indonesia

90th **Top 90** Philippines

56th **Top 60** Philippines

85th **Top 90** Indonesia

46th **Top 50** Viet Nam

76th **Top 80** Viet Nam

40th **Top 40** India

68th **Top 70** Türkiye

39th **Top 40** Türkiye

66th **Top 70** India

12th **Top 15** China

35th **Top 40** China

Group of middle-income economies within the GII top 65, which climbed fastest in the ranks over the last decade.

Standout economies' 4-year innovation surge, 2019–2023

88th Pakistan

61st Indonesia

57th Mauritius

49th Brazil

48th Saudi Arabia

In the last four years, and since the start of the pandemic, Mauritius, Indonesia Saudi Arabia, Brazil and Pakistan ascended the most (in order of their rank progression).

Source: Global Innovation Index Database, WIPO, 2023.
Note: Year-on-year comparisons of GII rankings need to take into account changes to the GII model that have occurred over time, as well as data availability.

The United Arab Emirates stabilizes at 32nd place, close to the top 30. Saudi Arabia (48th) and Qatar (50th) make it into the top 50. Middle East economies Bahrain (67th), Oman (69th), Jordan (71st) and Egypt (86th) also experience notable improvements in their innovation ranking – with Bahrain and Oman entering the top 70, and Jordan just outside. In sum, these are some systematic and positive innovation rank developments in the Middle East.

Brazil (49th) makes it into the top 50 in 2023, following a gradual ascent over recent years, overtaking Chile (52nd) as the most innovative economy in Latin America and the Caribbean. Uruguay (63rd) and El Salvador (95th) are the only two other economies within the region that improve their ranking in 2023.

Thailand (43rd) and Viet Nam (46th) consolidate their positions in the top 50, while the Philippines (56th) gets closer. Viet Nam and the Philippines continue marching forward, after a setback in 2022, gaining two and three ranks, respectively. Indonesia (61st) moves rapidly toward the top 60, following a rise over recent years. Together with China, India, the Islamic Republic of Iran (62nd), the Philippines, Türkiye and Viet Nam, Indonesia joins the group of middle-income economies within the GII top 65 that climbed fastest in the GII ranking over the last decade.

In the last four years, and since the start of the pandemic, Mauritius (57th), Indonesia, Saudi Arabia, Brazil and Pakistan ascended most in the GII, in order of their rank progression.

In Central and Southern Asia, Kazakhstan (81st) and Uzbekistan (82nd) are close to the top 80, while Pakistan (88th) follows closely, the latter overperforming on innovation once again in 2023.

Nine out of the 26 economies from Sub-Saharan Africa (SSA) covered this year improve their ranking. South Africa (59th) enters the top 60. Rwanda (103rd and low-income group leader) continues moving ahead. Senegal (93rd) and Nigeria (109th) take two of the biggest leaps forward. Excluding island economies, Senegal becomes the region's third most innovative economy in 2023 (see Figure 2).

Figure 2 Global innovation leaders in 2023

Top three innovation economies by region

Europe	Northern America	Latin America and the Caribbean	Central and Southern Asia
1. Switzerland	1. United States	1. Brazil ↑	1. India
2. Sweden	2. Canada	2. Chile ↓	2. Iran (Islamic Republic of)
3. United Kingdom		3. Mexico	3. Kazakhstan ☆

South East Asia, East Asia, and Oceania	Northern Africa and Western Asia†	Sub-Saharan Africa*
1. Singapore ↑	1. Israel	1. South Africa
2. Republic of Korea ↓	2. United Arab Emirates	2. Botswana
3. China	3. Türkiye	3. Senegal ☆

Top three innovation economies by income group

High-income	Upper middle-income	Lower middle-income	Low-income group
1. Switzerland	1. China	1. India	1. Rwanda
2. Sweden ↑	2. Malaysia ↑	2. Viet Nam	2. Madagascar
3. United States ↓	3. Bulgaria ↓	3. Ukraine ☆	3. Togo ☆

☆ Indicates a new entrant into the top three in 2023.

↑↓ Indicates movement in ranking (up or down) within the top three, relative to 2022.

* Top three in Sub-Saharan Africa (SSA) – excluding island economies. The top five within the region, including all economies, comprise Mauritius (1st), South Africa (2nd), Botswana (3rd), Cabo Verde (4th) and Senegal (5th).

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

Source: Global Innovation Index Database, WIPO, 2023.

Notes: World Bank Income Group Classification (July 2022). Year-on-year GII rank changes are influenced by performance and methodological considerations; some economy data are incomplete (see Appendix I).

Box 1 GII innovation indicators – 2023 trailblazers

The United States continues to lead in terms of number of GII innovation indicators for which it ranks top globally, ranking 1st in the world on 13 out of 80 indicators in 2023.

Singapore follows the United States globally and is number one worldwide on 11 indicators, the same amount as in 2022, including leading in Operational stability for businesses, Government effectiveness, ICT access, Logistics performance, Venture capital received, High-tech manufacturing, and GitHub commits. Israel follows in 3rd place, leading in nine innovation indicators, including R&D expenditure, University–industry R&D collaboration, PCT patents and ICT services exports. Switzerland and Hong Kong, China, tie jointly in 4th place, attaining top ranking in Patent families and High-tech imports, respectively. They are followed by Japan in 6th place, leading in Production and export complexity.

In addition to the top winners globally, there are middle- and low-income economies excelling in various domains. Relative to other countries and to its GDP or population, Namibia ranks 1st in Expenditure on education, Mozambique in Gross capital formation, and Cambodia and Nepal in Loans from microfinance institutions. Relatively, Mauritius leads globally in Venture capital investors, the Islamic Republic of Iran in Trademarks and Mongolia in Trademarks, as well as Industrial designs.

Box Table 1 Economies with the most GII indicators ranked top, 2023

	Innovation indicators that economies score best in worldwide		
Economy	Inputs	Outputs	Total
United States	6	7	13
Singapore	8	3	11
Israel	6	3	9
Switzerland	4	4	8
Hong Kong, China	5	3	8
Japan	4	3	7
China	2	4	6
Iceland	2	4	6
Malta	3	3	6
Finland	3	2	5
Estonia	4	1	5
Luxembourg	4	1	5

Source: Global Innovation Index Database, WIPO, 2023.
Note: The GII methodology allows multiple economies to rank 1st on any one indicator; see Economy profiles and Appendix I.

Mongolia (68th) and Egypt (86th) both improve their position by three places, while Senegal (93rd) gains six places.

Beyond the top 100, Rwanda (103rd), Nepal (108th), Nigeria (109th) and Togo (114th) have progressed the most in the rankings, increasing between two and eight positions this year. Rwanda performs exceptionally well in Institutions (33rd) and holds top ranks in Labor productivity growth (2nd), Policies for doing business (11th), Graduates in science and engineering (15th) and Venture capital recipients (20th). Rwanda also maintains 1st position among the low-income group, while Madagascar (107th) and Togo (114th) claim 2nd and 3rd position, respectively (Table 1).

Table 1 Top 10 economies by income group (rank)

Rank	Global Innovation Index 2023
High-income economies (48 in total)	
1	Switzerland (1)
2	Sweden (2)
3	United States (3)
4	United Kingdom (4)
5	Singapore (5)
6	Finland (6)
7	Netherlands (Kingdom of the) (7)
8	Germany (8)
9	Denmark (9)
10	Republic of Korea (10)

Rank	Global Innovation Index 2023
Upper middle-income economies (36 in total)	
1	China (12)
2	Malaysia (36)
3	Bulgaria (38)
4	Türkiye (39)
5	Thailand (43)
6	Brazil (49)
7	Russian Federation (51)
8	Serbia (53)
9	North Macedonia (54)
10	Mauritius (57)

Lower middle-income economies (37 in total)	
1	India (40)
2	Viet Nam (46)
3	Ukraine (55)
4	Philippines (56)
5	Indonesia (61)
6	Iran (Islamic Republic of) (62)
7	Mongolia (68)
8	Morocco (70)
9	Tunisia (79)
10	Uzbekistan (82)

Low-income economies (12 in total)	
1	Rwanda (103)
2	Madagascar (107)
3	Togo (114)
4	Zambia (118)
5	Uganda (121)
6	Burkina Faso (124)
7	Ethiopia (125)
8	Mozambique (126)
9	Guinea (128)
10	Mali (129)

Source: Global Innovation Index Database, WIPO, 2023.

Box 2 outlines important 'dos and don'ts', when using the GII to improve an economy's innovation performance.

Box 2 How to best use the Global Innovation Index (GII) and what not to do?

For many years, governments around the world have successfully used the Global Innovation Index (GII) to improve their economy's innovation performance and shape evidence-based innovation policies. A survey carried out by WIPO in 2022 showed 70 percent of WIPO member states were using the GII to improve innovation ecosystems and metrics, as well as it being a benchmark for national innovation policies or economic strategies. It is heartening to see that the GII is being used by a wide range of economies, from low- to high-income, across every one of the world's regions.

One major benefit of the GII is that it puts evidence and metrics at the core of conceiving, deploying and evaluating innovation policies. A first step brings together statisticians, innovation actors and policymakers in order to understand a country's innovation performance, based on the GII metrics. In a second step, the policy discussion turns to leveraging domestic innovation opportunities, while at the same time overcoming country-specific weaknesses. Both steps are an exercise in coordination among different public and private innovation actors, as well as between government entities. In select countries, the GII has facilitated just such a dialogue across innovation actors and government entities.

Some dos:

- Ensure innovation is embedded as a key priority in a country's pathway to national development and progress, possibly formulated within a clear innovation policy.
- Establish a cross-ministerial task force to pursue innovation policy matters through a "whole of government approach," ideally reporting to the top tier of government, for instance, the Prime Minister's Office.
- Ensure any innovation policy task force consults with innovation actors from both the private and public sectors, including start-ups, research universities and innovation clusters. The private sector, in particular, is key, as is broad representation from manufacturing, services and traditional industries, as well as diverse entrepreneurial strands.
- Ensure any national intellectual property (IP) policy is aligned with or even integrated into innovation policy.
- Ensure those targets or actions that are part of an innovation policy are quantifiable and can be evaluated.

Some don'ts:

- Do not set over-ambitious and therefore unrealistic GII ranking targets. GII rankings rarely increase in leaps and bounds from one year to the next, particularly at the top.
- Do not expect policy changes to result in immediate improved GII indicator performance. There are important lags between the formulation of innovation policy and its execution and impact. The latest available innovation data is also rarely current, often lagging by several years.
- Do not treat the GII as a mathematical exercise, that is, by attempting to collect or focus on specific indicators simply to climb the rankings. A country's GII rank alone is only a partial reflection of a national innovation ecosystem and related progress. Moreover, the GII framework changes regularly. Do not therefore over focus on year-on-year changes within the GII, because these are influenced by relative performance vis-à-vis other countries, together with other methodological considerations (see Appendix I). Setting objectives for a period of years – for example, three to five years – and then reviewing combined progress over several years is a more appropriate way of using the GII.

With this in mind, the GII has become a catalyst for the national collection of innovation indicators. Economies have an interest in ensuring the GII can rely on the complete and updated innovation metrics they provide. As detailed in Appendix III, the vast majority of GII data is not collected by the World Intellectual Property Organization (WIPO) itself directly from its member states. Instead, WIPO uses data submitted by economies to those organizations globally responsible for a particular data collection (e.g., the UNESCO Institute for Statistics for data relating to R&D). The sole exception is the intellectual property data WIPO collects annually from members states.[2] For all other data sets, the GII team is able to help countries identify missing and outdated data (marked clearly in the economy profiles and briefs) and advise data collectors on how to remedy the situation.

Finally, a new trend is the interest being expressed by countries in building sub-national innovation indices at the regional or city level that mirror the GII framework or comprise selected GII indicators (WIPO, 2023a). WIPO has pledged to support this work in two ways: (i) by organizing workshops on the exchange of best practice, and (ii) providing a background study on sub-national innovation indices.[3] Member states are welcome to join this effort.

Innovation overperformers

Several middle- and low-income economies are performing above expectation on innovation relative to their level of economic development

In the GII 2023, 21 economies are performing above expectation relative to their level of development – these are the GII innovation overperformers (Figure 3 and Table 2).

India, the Republic of Moldova and Viet Nam continue to be record holders by being innovation overperformers for a 13th consecutive year. The Republic of Moldova (60th) scores above its income level in Human capital and research (67th), as well as both output pillars – Knowledge and technology outputs (60th) and Creative outputs (42nd). The Philippines (56th) and Morocco (70th) keep their innovation overperformer status for a fifth time.

There are also two notable comebacks this year, namely, Senegal (93rd) and North Macedonia (54th). In addition, Indonesia (61st), Uzbekistan (82nd) and Pakistan (88th) keep their overperformer status for a second and Brazil (49th) for a third consecutive year.

From a regional perspective, this year there is an equal number of innovation overperformers in South East Asia, East Asia, and Oceania, and Sub-Saharan Africa, each region having five innovation overperformers. Tying in 3rd place, with three overperforming economies each, are Europe, Central and Southern Asia, and Northern Africa and Western Asia. In 6th place is Latin America and the Caribbean, with two innovation overperformers.

Conversely, 37 economies are performing below expectation on innovation, the majority from Latin America and the Caribbean (11) and Sub-Saharan Africa (9). Among the high-income group, three are Eastern European economies, namely, Poland (41st), Slovakia (45th) and Romania (47th).

In the upper middle-income group, the six underperformers are Latin American and Caribbean economies Argentina (73rd), Costa Rica (74th), the Dominican Republic (94th), Paraguay (98th), Ecuador (104th) and Guatemala (122nd). All six of these economies also drop down the GII ranking in 2023. In the lower middle-income group, nine economies are performing below expectation for their level of development, including Sub-Saharan African economies Côte d'Ivoire (112th), Benin (120th), Cameroon (123rd), Mauritania (127th) and Angola (132nd).

Relative to 2022, 23 economies have switched performance groups. Seven economies have raised their performance status from below expectation to matching expectation, namely, Lithuania (34th), Greece (42nd), Egypt (86th), El Salvador (95th), Namibia (96th), Nigeria (109th) and Zambia (118th).

Figure 3 Innovation overperformers, relative to their economic development

Source: Global Innovation Index Database, WIPO, 2023.

Note: Bubbles sized according to population. The cubic spline trendline shows the expected level of innovation performance at different levels of GDP per capita for all economies covered in the GII 2023.

Table 2 Innovation overperformers in 2023: Income group, region and years as an innovation overperformer

Economy	Income group	Region	Years as an innovation overperformer (total)
India	Lower middle-income	Central and Southern Asia	2011–2023 (13)
Republic of Moldova	Upper middle-income	Europe	2011–2023 (13)
Viet Nam	Lower middle-income	South East Asia, East Asia, and Oceania	2011–2023 (13)
Mongolia	Lower middle-income	South East Asia, East Asia, and Oceania	2011–2015, 2018–2023 (11)
Rwanda	Low-income	Sub-Saharan Africa	2012, 2014–2023 (11)
Ukraine	Lower middle-income	Europe	2012, 2014–2023 (11)
Thailand	Upper middle-income	South East Asia, East Asia, and Oceania	2011, 2014–2015, 2018–2023 (9)
Jordan	Upper middle-income	Northern Africa and Western Asia	2011–2015, 2022–2023 (7)
Madagascar	Low-income	Sub-Saharan Africa	2016–2018, 2020–2023 (7)
Senegal	Lower middle-income	Sub-Saharan Africa	2012–2015, 2017, 2023 (6)
South Africa	Upper middle-income	Sub-Saharan Africa	2018–2023 (6)
Morocco	Lower middle-income	Northern Africa and Western Asia	2015, 2020–2023 (5)
Philippines	Lower middle-income	South East Asia, East Asia, and Oceania	2019, 2020–2023 (5)
Tunisia	Lower middle-income	Northern Africa and Western Asia	2018, 2020–2023 (5)
Burundi	Low-income	Sub-Saharan Africa	2017, 2019, 2022–2023 (4)
Brazil	Upper middle-income	Latin America and the Caribbean	2021–2023 (3)
Jamaica	Upper middle-income	Latin America and the Caribbean	2020, 2022–2023 (3)
North Macedonia	Upper middle-income	Europe	2019–2020, 2023 (3)
Indonesia	Lower middle-income	South East Asia, East Asia, and Oceania	2022–2023 (2)
Pakistan	Lower middle-income	Central and Southern Asia	2022–2023 (2)
Uzbekistan	Lower middle-income	Central and Southern Asia	2022–2023 (2)

Source: Global Innovation Index Database, WIPO, 2023.

Notes: Income group classification follows the World Bank Income Group Classification (July, 2022). Geographical regions correspond to the United Nations publication on standard country or area codes for statistical use (M49).

Converting innovation investment into tangible innovation output

Several middle-income economies are more efficient at translating innovation inputs into outputs than their high-income counterparts

Among high-income economies, Switzerland leads (1st) in producing higher levels of outputs compared to Sweden (2nd), the United States (3rd) and Finland (6th), while Germany (8th) produces similar output levels to the United States and the Kingdom of the Netherlands (7th), but with lower input levels (Figure 4).

Among upper middle-income group economies, China (12th) also shines, producing levels of outputs comparable to high-income economies like Singapore (5th), Denmark (9th) and France (11th), but with fewer inputs. Türkiye (39th) does likewise relative to New Zealand (27th) and Hungary (35th).

Among the lower-middle income group, Morocco (70th) and Pakistan (88th) are efficient innovators, while Madagascar (107th) stands out among the low-income group.

However, certain economies, including the United Arab Emirates (32nd), Saudi Arabia (48th), Qatar (50th), Serbia (53rd), Bahrain (67th), Peru (76th), and Cabo Verde (91st), struggle to translate inputs into outputs, affecting their overall innovation performance.

This year, Canada (15th), Norway (19th) and Uzbekistan (82nd) have improved in converting inputs into outputs, no longer underperforming on this metric.

Figure 4 Innovation input to output performance, 2023

Source: Global Innovation Index Database, WIPO, 2023.

Table 3 Heatmap: GII 2023 rankings overall and by innovation pillar, 2023

Country/economy	Overall GII	Institutions	Human capital and research	Infrastructure	Market sophistication	Business sophistication	Knowledge and technology outputs	Creative outputs
Switzerland	1	2	6	4	7	5	1	1
Sweden	2	18	3	2	10	1	3	8
United States	3	16	12	25	1	2	2	12
United Kingdom	4	24	8	6	3	13	7	2
Singapore	5	1	2	8	6	3	10	18
Finland	6	3	5	1	12	4	4	16
Netherlands (Kingdom of the)	7	6	13	14	15	8	8	9
Germany	8	22	4	23	14	16	9	7
Denmark	9	5	9	3	21	12	12	10
Republic of Korea	10	32	1	11	23	9	11	5
France	11	27	17	22	9	17	16	6
China	12	43	22	27	13	20	6	14
Japan	13	21	18	13	8	11	13	25
Israel	14	40	20	36	11	6	5	33
Canada	15	14	10	30	4	18	19	22
Estonia	16	11	34	5	5	25	20	15
Hong Kong, China	17	8	15	9	2	28	51	3
Austria	18	13	11	12	39	19	17	13
Norway	19	4	19	7	29	22	28	23
Iceland	20	9	24	10	32	15	25	20
Luxembourg	21	7	31	31	35	7	38	11
Ireland	22	15	28	18	51	14	14	26
Belgium	23	30	14	44	26	10	15	30
Australia	24	17	7	19	17	24	30	24
Malta	25	34	39	17	43	21	36	4
Italy	26	52	33	21	40	33	18	21
New Zealand	27	12	21	29	31	29	39	28
Cyprus	28	41	38	32	38	31	23	17
Spain	29	46	27	16	33	32	24	29
Portugal	30	35	23	45	42	34	32	19
Czech Republic	31	36	30	24	82	27	21	32
United Arab Emirates	32	10	16	15	25	23	59	50
Slovenia	33	38	25	20	68	26	27	48
Lithuania	34	19	42	43	34	35	29	41
Hungary	35	47	36	42	64	30	26	38
Malaysia	36	29	32	51	18	36	37	47
Latvia	37	39	43	33	61	37	49	31
Bulgaria	38	66	66	28	60	42	34	34
Türkiye	39	105	41	50	36	46	44	27
India	40	56	48	84	20	57	22	49
Poland	41	76	40	47	67	41	40	35
Greece	42	63	29	38	66	62	43	39
Thailand	43	85	74	49	22	43	42	44
Croatia	44	72	44	26	48	53	33	52
Slovakia	45	65	53	41	72	47	31	56
Viet Nam	46	54	71	70	49	49	48	36
Romania	47	74	75	34	75	51	35	58
Saudi Arabia	48	45	35	48	28	45	68	66
Brazil	49	99	56	58	50	39	52	46
Qatar	50	23	54	39	44	73	82	65
Russian Federation	51	110	26	72	56	44	54	53
Chile	52	49	58	52	47	55	58	59
Serbia	53	57	51	35	41	68	41	92
North Macedonia	54	75	78	40	30	60	53	69
Ukraine	55	100	47	77	104	48	45	37
Philippines	56	79	88	86	55	38	46	60
Mauritius	57	26	64	74	24	91	90	57
Mexico	58	111	63	65	57	79	57	45
South Africa	59	88	84	68	45	61	56	63
Republic of Moldova	60	96	67	75	76	101	60	42
Indonesia	61	70	85	69	37	77	61	68
Iran (Islamic Republic of)	62	131	60	97	19	117	55	43
Uruguay	63	31	83	57	86	59	66	78
Kuwait	64	86	55	46	62	103	73	64
Georgia	65	25	69	80	77	58	72	81
Colombia	66	78	81	60	73	40	62	80

1th quartile (best performers, ranks 1st to 33rd) 2rd quartile (ranks 34th to 66th) 3nd quartile (ranks 67th to 99th) 4st quartile (ranks 100th to 132nd)

Table 3 Continued

Country/economy	Overall GII	Institutions	Human capital and research	Infrastructure	Market sophistication	Business sophistication	Knowledge and technology outputs	Creative outputs
Bahrain	67	28	77	37	78	92	74	98
Mongolia	68	80	65	81	101	67	88	40
Oman	69	62	52	61	74	95	75	79
Morocco	70	83	86	94	80	107	65	55
Jordan	71	51	82	87	53	70	76	75
Armenia	72	69	92	79	89	94	67	61
Argentina	73	123	70	66	92	54	79	51
Costa Rica	74	48	79	62	90	63	70	89
Montenegro	75	82	62	56	54	66	80	85
Peru	76	81	50	63	52	52	101	74
Bosnia and Herzegovina	77	104	68	67	27	106	64	91
Jamaica	78	53	91	91	109	69	92	54
Tunisia	79	107	46	89	98	119	50	72
Belarus	80	128	37	71	99	74	47	88
Kazakhstan	81	61	59	59	87	75	83	90
Uzbekistan	82	55	89	73	69	78	78	93
Albania	83	60	96	53	93	50	91	87
Panama	84	77	103	55	102	124	87	67
Botswana	85	37	73	85	70	56	117	106
Egypt	86	103	95	90	88	100	77	73
Brunei Darussalam	87	20	57	54	105	80	126	127
Pakistan	88	113	117	120	97	72	69	70
Azerbaijan	89	42	87	95	85	64	114	100
Sri Lanka	90	124	110	82	106	71	71	83
Cabo Verde	91	44	97	64	96	65	98	108
Lebanon	92	125	72	96	46	76	86	96
Senegal	93	59	107	98	81	122	63	113
Dominican Republic	94	67	109	76	91	86	95	94
El Salvador	95	101	106	99	95	85	94	77
Namibia	96	50	76	100	84	99	123	104
Bolivia (Plurinational State of)	97	132	61	104	16	81	106	102
Paraguay	98	112	129	83	79	87	109	76
Ghana	99	93	105	105	117	83	111	71
Kenya	100	84	118	107	108	84	81	95
Cambodia	101	87	101	108	59	125	93	103
Trinidad and Tobago	102	68	45	88	124	113	103	109
Rwanda	103	33	94	101	115	109	100	117
Ecuador	104	109	98	78	103	90	102	99
Bangladesh	105	108	125	93	100	126	89	82
Kyrgyzstan	106	122	49	92	71	114	96	116
Madagascar	107	121	102	131	113	123	121	62
Nepal	108	114	123	110	63	89	110	101
Nigeria	109	115	80	123	127	82	124	84
Lao People's Democratic Republic	110	95	115	109	65	102	97	124
Tajikistan	111	90	99	122	94	110	85	123
Côte d'Ivoire	112	71	128	106	123	96	118	97
United Republic of Tanzania	113	73	126	115	83	105	119	120
Togo	114	102	111	117	111	131	108	105
Nicaragua	115	127	120	113	58	97	122	111
Honduras	116	126	90	112	107	104	107	114
Zimbabwe	117	130	104	119	121	112	113	86
Zambia	118	119	93	111	110	98	130	112
Algeria	119	97	113	102	125	120	128	107
Benin	120	58	114	114	118	111	116	129
Uganda	121	64	124	116	128	118	105	122
Guatemala	122	120	122	118	112	93	99	119
Cameroon	123	91	112	130	129	88	104	118
Burkina Faso	124	92	108	121	116	128	112	130
Ethiopia	125	116	131	132	114	130	84	126
Mozambique	126	129	116	103	122	129	127	115
Mauritania	127	89	119	124	130	108	115	131
Guinea	128	98	132	127	132	127	125	110
Mali	129	117	121	128	126	115	120	128
Burundi	130	106	100	126	131	121	131	125
Niger	131	94	130	125	120	116	129	132
Angola	132	118	127	129	119	132	132	121

1st quartile (best performers, ranks 1st to 33rd) 2nd quartile (ranks 34th to 66th) 3nd quartile (ranks 67th to 99th) 4st quartile (ranks 100th to 132nd)

Source: Global Innovation Index Database, WIPO, 2023.

Box 3 Who leads on unicorns?

A unicorn company is a privately held startup valued at over USD 1 billion.[4] Unicorn companies exhibit rapid growth. They often disrupt industries by introducing innovative products, services or business models that have the potential to reshape entire sectors.

This 2023 edition of the GII includes a new indicator showing the combined valuation of a country's unicorn companies (6.2.2 Unicorn valuation, % GDP; see Appendix III).

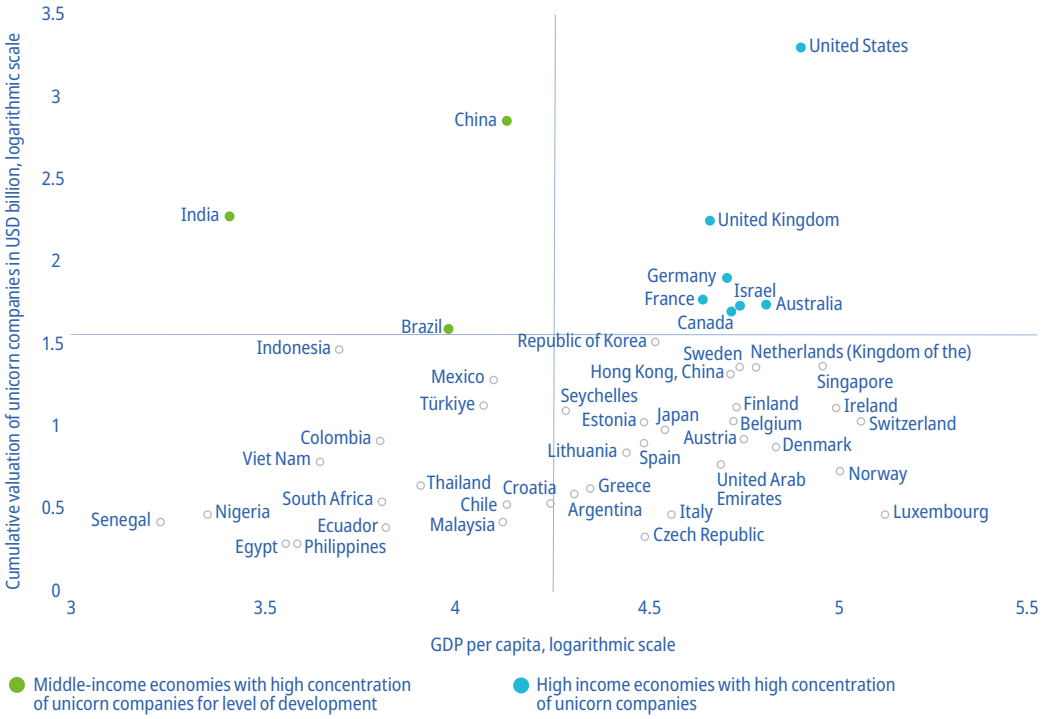
According to CBInsights' Tracker of Unicorn companies, as of April 2023, there were 1,206 unicorn companies located in 50 different countries globally.[5] According to a simple count, only five economies host 80 percent of all the world's unicorns, namely, the United States (54 percent), China (14 percent), India (6 percent), the United Kingdom (4 percent) and Germany (2 percent). Out of a total unicorn valuation of USD 3.8 trillion in 2023, US unicorns account of USD 2 trillion – a huge lead – followed by China at USD 736 billion and India at USD 193 billion.

Of the top 25 most valuable unicorn companies and their origin, China comes first, with ByteDance (1st, artificial intelligence), followed by SHEIN (3rd, e-commerce) and Xiaohongshu (12th, e-commerce). The United States follows, with SpaceX (2nd, space and telecommunications), Stripe (4th, fintech) and Epic Games (7th, videogames). Australia has Canva (5th, graphic design and software) and Indonesia has J&T Express (13th, logistics and delivery).

In the GII, the cumulative value of unicorns is scaled by GDP. After scaling, five economies tie in first place, namely, Estonia, Israel, Lithuania, Senegal and the United States. Estonia leads with Bolt (auto and transportation), Israel with Wiz (cybersecurity), Lithuania has Vinted (e-commerce) and Senegal leads with Wave (fintech). These five top hubs for unicorns are followed by Hong Kong, China (6th), the United Kingdom (7th), Singapore (8th), India (9th) and Finland (10th).

Plotting an economy's level of development against the cumulative value of its unicorn companies shows whether it is overperforming relative to level of development. In the figure below, most economies in the upper-right quadrant are in the high-income group. The lower-right quadrant also contains high-income economies – largely European – but with a lower concentration of unicorn companies.

Box Figure 1 Unicorn valuation by level of economic development, 2023



Source: Authors, based on CBInsights, 2023 and IMF World Economic Outlook, April 2023.

The economies in the left-hand quadrants are the most interesting cases. Upper-left, middle-income economies China, India and Brazil shine, having a high concentration of unicorn companies relative to their level of development. Lower left are those middle- and low-income economies hosting unicorn companies, even when their valuation is relatively lower. Latin American economies are the most represented, comprising Argentina, Chile, Colombia, Ecuador and Mexico, with leading unicorns Kavak (Mexico, e-commerce), Rappi (Colombia, supply chain) and Uala (Argentina, fintech).

Innovation leaders (top 25) demonstrate balanced and strong performance across all seven pillars. They include France (11th), Japan (13th), Canada (15th), Norway (19th), Iceland (20th) and Australia (24th) (Table 3). Some lower-ranked economies excel in specific innovation pillars, such as Georgia and Rwanda in Institutions (25th and 33rd, respectively), Trinidad and Tobago in Human capital and research (45th), Croatia (44th) in Infrastructure (26th), and Malaysia and Thailand in Market sophistication (18th and 22nd, respectively). India and Slovakia excel in Knowledge and technology outputs (22nd and 31st, respectively), while Türkiye and Latvia shine in Creative outputs (27th and 31st, respectively). These examples showcase the diverse strengths of economies vibrant in innovation, which can be nurtured to enhance their overall rankings.

Innovation across the world's regions

South East Asia, East Asia, and Oceania continues to narrow the gap with Europe, while Central and Southern Asia is getting closer to Latin America and the Caribbean

For yet another year, there are no changes in the rankings of the world's regions, based on an unweighted average GII score of all economies within a region. Northern America and Europe continue to lead, followed by South East Asia, East Asia, and Oceania (SEAO). Northern Africa and Western Asia, Latin America and the Caribbean, Central and Southern Asia, and Sub-Saharan Africa, follow more distantly. However, this year, the distance dividing economies in the SEAO region from those in Europe is on average no more than four GII score points, while economies in Central and Southern Asia are narrowing the gap between them and those in Latin America and the Caribbean.

Northern America
Largely driven by the United States, Northern America, comprising the United States and Canada, is the most innovative world region. Canada performs best in Market sophistication (4th), Human capital and research (10th) and Institutions (14th). It continues to lead in indicators Venture capital recipients (1st), the impact of its scientific publications (H-Index, 4th) and Software spending (5th).

Europe
Europe still hosts the highest number of innovation leaders among the top 25 – 16 in total, one more than in 2022. Out of 39 European economies covered, 19 move up the rankings this year (seven more than last year), namely, Sweden (2nd), Finland (6th), Denmark (9th), France (11th), Estonia (16th), Norway (19th), Ireland (22nd), Belgium (23rd), Italy (26th), Portugal (30th), Lithuania (34th), Latvia (37th), Greece (42nd), Slovakia (45th), Romania (47th), Serbia (53rd), North Macedonia (54th), Ukraine (55th) and Albania (83rd).

Among economies improving, France excels in Intangible assets (3rd), Global brands (4th), Industrial designs (8th) and Global corporate R&D investors (9th). Top companies like LVMH, L'Oreal and Christian Dior are contributing to its success. Belgium is performing well in R&D expenditure (6th), Researchers (8th) and University–industry R&D collaboration (9th). Serbia approaches the top 50 with a strong performance in FDI inflows (11th) and Labor productivity growth (14th).

This year, the Nordic and Baltic economies have made notable progress.

South East Asia, East Asia, and Oceania
The difference in GII scores between the South East Asia, East Asia, and Oceania (SEAO) region and Europe continues to diminish. Six SEAO economies are world innovation leaders, namely, Singapore (5th), the Republic of Korea (10th), China (12th), Japan (13th), Hong Kong, China (17th) and Australia (24th). These six economies continue to lead in key innovation indicators. China leads globally (1st) in Labor productivity growth, Japan in Production and export complexity, the Republic of Korea in PCT patents, Australia in School life expectancy, Hong Kong, China in Global brand value and Singapore in Venture capital received.

Eight economies within the SEAO region improve their rankings this year, with Indonesia (61st) making the greatest advance. Indonesia makes marked improvements in innovation outputs, notably in Knowledge creation and Online creativity. It excels in ICT-related indicators and ranks among the top 10 globally for University–industry R&D collaboration (5th), State of cluster development (5th), Entrepreneurship policies and culture (5th) and Finance for startups and scaleups (8th).

Mongolia (68th), Brunei Darussalam (87th) and the Lao People's Democratic Republic (110th) also move up the rankings.

Central and Southern Asia

Within Central and Southern Asia, India continues to lead, maintaining its 40th position overall. India leads the lower middle-income group (Table 1), performing strongly in every innovation pillar except for Infrastructure. It holds top ranking within the Central and Southern Asia region for Human capital and research (48th), Business sophistication (57th) and Knowledge and technology outputs (22nd). Strong indicators include ICT services exports (5th), Venture capital received (6th), Graduates in science and engineering (11th) and Global corporate R&D investors (13th).

The Islamic Republic of Iran is 2nd within the region once again, at 62nd position. It is the regional leader in Market sophistication (19th) and Creative outputs (43rd). It performs well in Intangible assets (13th), ranks 1st globally in Trademarks (1st) and in the top 15 worldwide in Graduates in science and engineering (3rd), Market capitalization (5th) and Industrial designs (11th).

Kazakhstan (81st) takes over 3rd position within the region, gaining two ranks and displacing Uzbekistan to 4th, which retains its 82nd position overall. Only Kazakhstan and Nepal (108th) within the region go up the rankings. Kazakhstan tops in Infrastructure (59th), thanks to its good performance in Government's online service (8th) and E-participation (15th).

Northern Africa and Western Asia

In Northern Africa and Western Asia, Israel (14th) has made significant progress this year and consistently leads the region as a whole. Israel stands out in various areas, holding top position in Market sophistication (11th), Business sophistication (6th) and Knowledge and technology outputs (5th). Furthermore, it distinguishes itself globally as the one country that allocates over 5 percent of GDP to R&D, with a remarkable expenditure of 5.6 percent in 2021.

Saudi Arabia (48th) enters the top 50, leading globally in ICT access (7th), ICT use (10th) and Policies for doing business (16th). It also excels for its Global corporate R&D investors (16th) and for its Global brand value (18th), thanks to leaders Aramco (oil and gas), stc (telecoms) and Al-Rajhi Bank (banking). Oman also takes a big leap forward this year by achieving 69th place, and ranks among the top 10 worldwide in Graduates in science and engineering (2nd) and Government funding per pupil (9th).

An additional seven economies within the region move up the ranking, including notable improvers Georgia (65th), Bahrain (67th), Jordan (71st) and Armenia (72nd).

Latin America and the Caribbean

In Latin America and the Caribbean, Brazil (49th) holds top position, followed by Chile (52nd), while Mexico maintains 3rd place at 58th. Uruguay (63rd) and El Salvador (95th) are the only other countries within the region to have improved their position this year.

Uruguay is the regional leader in Institutions (31st), Peru leads in Human capital and research (50th), Chile in Infrastructure (52nd), Brazil is top of the region for Business sophistication (39th) and Knowledge and technology outputs (52nd), while Mexico tops in Creative outputs (45th).

Brazil (49th) climbs up five ranks this year, improving notably in the Innovation Outputs Sub-Index (49th). It ranks 22nd globally for the valuation of its 16 unicorn companies, representing 1.9 percent of its GDP in 2023, thanks to leaders QuintoAndar (e-commerce), C6 Bank (fintech) and Creditas (fintech) (Box 3). It also improves in Intangible assets (31st), ranking 13th worldwide for its Trademarks, and in Global brand value (39th), thanks to its leading banking brands, Itaú, Bradesco and Banco do Brasil. It ranks among the top 15 globally for Government's online service (14th) and E-participation (11th).

Uruguay leads in the top 10 for Policies for doing business (4th), ICT services imports (5th) and exports (7th), and Operational stability for businesses (10th). El Salvador can point to its ranking for Firms offering formal training (15th) and Trademarks (20th).

This year, Brazil and Jamaica continue to perform above expectation for their level of development (Table 2). Conversely, the performance status of Costa Rica (74th) has declined, no longer meeting expectation but instead performing below expectation for its level of development.

Sub-Saharan Africa

In Sub-Saharan Africa, only Mauritius (57th) and South Africa (59th) rank among the top 60, with South Africa entering this group having gained two ranks since last year. Six of the region's other economies rank within the top 100 globally, namely, Botswana (85th), Cabo Verde (91st) – making a comeback to the GII in 2023 – Senegal (93rd), Namibia (96th), Ghana (99th) and Kenya (100th). Nine of the region's economies move up the GII ranking, including South Africa, Senegal, Rwanda (103rd), Togo (114th) and Mauritania (127th).

Botswana (85th) continues moving ahead, gaining one rank and retaining 2nd position within the region. South Africa (59th) – moving ahead by two ranks and entering the top 60 – Madagascar (107th) and Burundi (130th) are also innovation overperformers this year. Other notable improvers within the region are Nigeria (109th), Togo (114th), Benin (120th) and Guinea (128th).

Mauritius ranks highest within the region in Institutions (26th), Human capital and research (64th), Market sophistication (24th) and Creative outputs (57th). It leads worldwide in Venture capital investors (1st) and ranks 5th in Venture capital received. Cabo Verde leads the region in Infrastructure (64th) and performs well in indicators Gross capital formation (3rd), Expenditure on education (13th) and FDI inflows (17th). Botswana tops in Business sophistication (56th), and performs well in Loans from microfinance institutions (12th).

South Africa heads the region in Knowledge and technology outputs (56th), thanks to its good performance in Software spending (28th), Patents by origin (34th), PCT patents (40th) and for the valuation of its two unicorn companies (37th), Promasidor Holdings (consumer and retail) and Cell C (mobile and telecommunications).

Finally, Senegal gains six ranks this year, improving notably in Knowledge and technology outputs (63rd). It ranks 1st in the world for the valuation of its unicorn company Wave (fintech), sharing top place with high-income economies Estonia, Israel, Lithuania and the United States. It also performs well in Gross capital formation (8th), Loans from microfinance institutions (10th), FDI inflows (13th) and Venture capital received (19th).

Box 4 Innovation as the driver of the United Nations Sustainable Development Goals

The 2030 Agenda for Sustainable Development, with its 17 Sustainable Development Goals (SDGs), has set an ambitious agenda. While technology and innovation are a recognized key facilitator in achieving all related targets, innovation is a specific policy target in its own right. SDG 9 specifically targets innovation-related goals, in particular target 9.5, which promotes increasing R&D expenditure as a proportion of GDP (9.5.1), and increasing the number of researchers per million inhabitants (9.5.2), both of which are also important GII indicators.[6]

In this context, the GII has been recognized an authoritative benchmark for measuring innovation within the 2019 and 2021 UN General Assembly resolutions on Science, Technology and Innovation for Sustainable Development. Events such as the eighth annual Multi-Stakeholder Forum on Science, Technology and Innovation for the SDGs (STI Forum) held this year in May 2023 concern the role that can be played by innovation in accelerating the post-pandemic recovery.[7]

Looking forward, around the time of the GII launch in September 2023, an SDG Summit is due to be convened during the High-Level Week of the UN General Assembly marking the mid-way point in the agenda – which has seven more years to run – and to accelerate action during the lead up to 2030.[8]

Conclusion

Several key insights emerge from this year's GII report.

- The global innovation landscape is changing at this time of pandemic and recovery and geopolitical upheaval, not only within the group of leading innovation economies, but more widely. As a result, some of the changes in GII rank this year may partly reflect short rather than longer term trends. The most notable changes to the innovation landscape are as follows:
  - There has been a shift within this year's top 20 innovators, with Sweden, Singapore, Finland, Denmark, France and Israel (in order of their ranking) moving up the ranking, and generally a strong showing by the Nordic and Baltic countries.
  - There is a mixed picture for leading emerging economies, with Indonesia rising fast over recent years, the Philippines and Viet Nam progressing again and India stable, but with China, Türkiye and the Islamic Republic of Iran falling back slightly, possibly in part due to recent COVID-19 induced effects.
  - India, the Republic of Moldova and Viet Nam have overperformed on innovation relative to development for a 13th year in a row, with Indonesia, Uzbekistan and Pakistan maintaining the overperformer status they first achieved in 2022, and Brazil overperforming on innovation relative to development for a third consecutive year.
  - There are some systematically positive innovation ranking developments in the Middle East, with the United Arab Emirates (UAE) close to the top 30, and Saudi Arabia, Qatar, Bahrain, Oman and other neighboring countries progressing up the rankings.
  - Mauritius and South Africa are leading Sub-Sahara Africa, with solid positions in the GII top 60, and a total of five economies within the region overperforming on innovation, with Rwanda having done so for the longest.
- Similar to last year, and excepting those economies just mentioned, more middle- and low-income economies would benefit from more a systematic and gradual improvement to the set-up and performance of their innovation ecosystem.
- Today, more than ever, pandemic impacts, downward pressure on risk capital, high interest rates and high debt levels, together with the effects of disruption to global supply chains on nascent innovation systems in middle- and low-income economies, all need close monitoring. This is to preserve the many positive changes that have come about over the last two decades in terms of getting innovation systems and policies onto the agenda of developing countries' policymakers, legislators and innovation actors. Closely monitoring the evolution of innovation is key also in the SDG context (see Box 4).

Future editions of the GII will continue to track developments closely – and innovation impacts, in particular – with the aim of fostering a better understanding of innovation and its measurement. Future editions will tell us which of the GII performance changes at the country or regional level listed above are transitory and which longer term in nature.

Notes

1 It is difficult to determine whether this decline has been caused directly by the COVID-19 pandemic. However, it is worth noting that approximately 93 percent of the data points used for China in this year's model span the period from 2020 to 2023.

2 See www.wipo.int/ipstats.

3 The study reviews the applicability of the GII framework to the development of sub-national innovation metrics. It analyses the existing sub-national innovation indices of WIPO Member States who have pioneered this field. It also determines which future innovation metrics are applicable to the measurement of innovation at the sub-national level, particularly those exploiting "big data" and new computational methods. See WIPO (2023a).

4 Aileen Lee, a venture capitalist, coined the term in 2013. See: https://techcrunch.com/2013/11/02/welcome-to-the-unicorn-club.

5 www.cbinsights.com/research-unicorn-companies.

6 https://sdgs.un.org/goals/goal9.

7 https://sdgs.un.org/tfm/STIForum2023. See also the WIPO side event on the "The future of innovation-driven growth: Will the novel Digital Age and Deep Science waves drive a global revival?," on May 3, 2023, organized by WIPO, Oxford University Said Business School, the Brazilian National Confederation of Industry (CNI) and the Permanent Mission of Brazil to the United Nations, https://sdgs.un.org/sites/default/files/2023-05/Innovation-Driven%20Growth.pdf.

8 For more on the role of intellectual property in achieving SDGs, see WIPO (2023b) and www.wipo.int/sdgs.

Reference

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The *Global Innovation Index 2023* (GII) takes the pulse of innovation against a background of an economic and geopolitical environment fraught with uncertainty.

Tracking the most recent global innovation trends, the GII finds that – despite a climate of disquiet and a decline in risk capital investment – opportunities abound as a result of the incipient *Digital Age* and *Deep Science* innovation waves.

At its core, the GII 2023 reveals who is leading in global innovation, ranking the innovation performance of 132 economies and highlighting their strengths and weaknesses. In addition, it identifies the world's top 100 science and technology clusters.

The GII is a "tool for action" regarding innovation policy. Governments around the world have used the GII to benchmark innovation performance, perfect innovation metrics and, ultimately, to shape evidence-based innovation policymaking.

In the context of the United Nations Sustainable Development Goals (SDGs), since 2019, the GII has been recognized by the United Nations General Assembly to be a benchmark for measuring innovation, including more recently in a post-pandemic environment.

The full report can be downloaded at www.wipo.int/global_innovation_index.

The 132 interactive GII economy briefs can be accessed at www.wipo.int/gii-ranking.

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