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

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 †

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).
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Source: Global Innovation Index Database, WIPO, 2023.

Note: For an explanation of classifications, see Economy profiles, endnote 1.
## Innovation performance at different income levels, 2023

### High-income group
- Switzerland
- Sweden
- United States
- United Kingdom
- Finland
- Netherlands (Kingdom of the)
- Germany
- Denmark
- Republic of Korea
- France
- Japan
- Israel
- Canada
- Estonia
- 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
- Luxembourg
- Ireland
- United Arab Emirates
- Poland
- Slovakia
- Romania
- Saudi Arabia
- Qatar
- Uruguay
- Kuwait
- Bahrain
- Oman
- Panama
- Brunei Darussalam
- Trinidad and Tobago

### Upper middle-income group
- China
- Thailand
- Brazil
- North Macedonia
- South Africa
- Republic of Moldova
- Jordan
- Jamaica
- Malaysia
- Bulgaria
- Türkiye
- Serbia
- Mauritius
- Mexico
- Georgia
- Colombia
- Armenia
- Peru
- Bosnia and Herzegovina
- Albania
- Namibia
- Russian Federation
- Argentina
- Costa Rica
- Montenegro
- Belarus
- Kazakhstan
- Botswana
- Azerbaijan
- Dominican Republic
- Paraguay
- Ecuador
- Guatemala

### Lower middle-income group
- India
- Viet Nam
- Ukraine
- Philippines
- Indonesia
- Mongolia
- Morocco
- Tunisia
- Uzbekistan
- Pakistan
- Senegal
- 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
- Lao People’s Democratic Republic
- Côte d’Ivoire
- Nicaragua
- Honduras
- Algeria
- Benin
- Cameroon
- Mauritania
- Angola

### Low-income group
- Rwanda
- Madagascar
- Burundi
- Togo
- Zambia
- Uganda
- Burkina Faso
- Mozambique
- Niger
- Ethiopia
- Guinea
- Mali

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Source: Global Innovation Index Database, WIPO, 2023.
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, CO₂ emissions continue to increase. If this trend persists, there is no global reduction in CO₂ emissions on the horizon.

Global Innovation Tracker Dashboard

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 (52\textsuperscript{nd}) and Mexico (58\textsuperscript{th}).
- In Central and Southern Asia, India continues to lead, and the Islamic Republic of Iran (62\textsuperscript{nd}) and Kazakhstan (81\textsuperscript{st}, a newcomer to the region's top 3) come next.
- In Sub-Saharan Africa, Mauritius (57\textsuperscript{th}) is followed by South Africa (59\textsuperscript{th}), Botswana (85\textsuperscript{th}), Cabo verde (91\textsuperscript{st}) and Senegal (93\textsuperscript{rd}).
- India leads the lower middle-income group, followed by Viet Nam and Ukraine (55\textsuperscript{th}). Ukraine is a newcomer to this income group's top 3, based on data that mostly predate 2022.
- Rwanda (103\textsuperscript{rd}) leads the low-income group, followed by Madagascar (107\textsuperscript{th}) and Togo (114\textsuperscript{th}), 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 (60\textsuperscript{th}) and Viet Nam continue as record holders by being innovation overperformers for a 13\textsuperscript{th} 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 (54\textsuperscript{th}).
- 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.