Financing for Development 2025 Fact Sheet on Science, Technology, Innovation and Capacity-building

Confidential - Draft for Consultations

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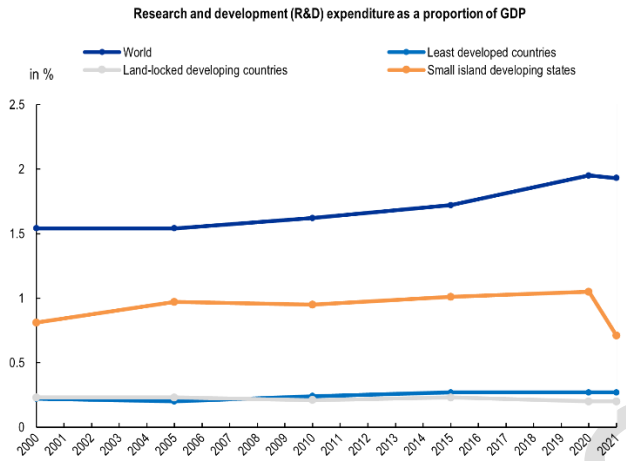
Data dashboard

Key trends

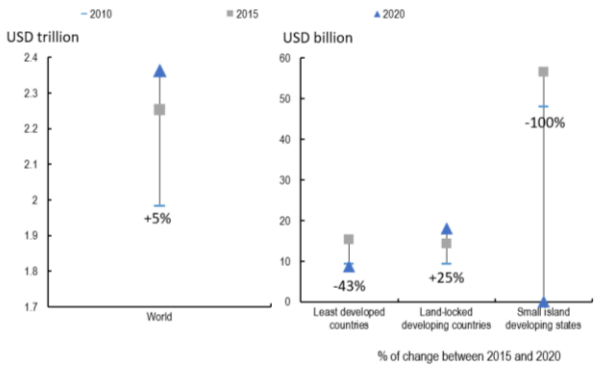
Research and development (R&D) expenditure as a proportion of gross domestic product (GDP) has risen globally since 2015 but has flatlined in developing countries.



Source: Author based on UN ECOSOC (2024), Progress towards the Sustainable Development Goals, Statistical Annex

Global R&D expenditure as a proportion of GDP rose by 12% since 2015 and 25% since 2000, reaching 1.93% in 2021. But the R&D share remained flat in countries most in need, and in many countries, GDP grew faster than leading to a decline in this ratio in 2021, particularly in the recovery period after the COVID-19 crisis.

Global trade in tracked environmentally sound technologies (ESTs) has increased globally but decreased in least developed countries (LDCs).

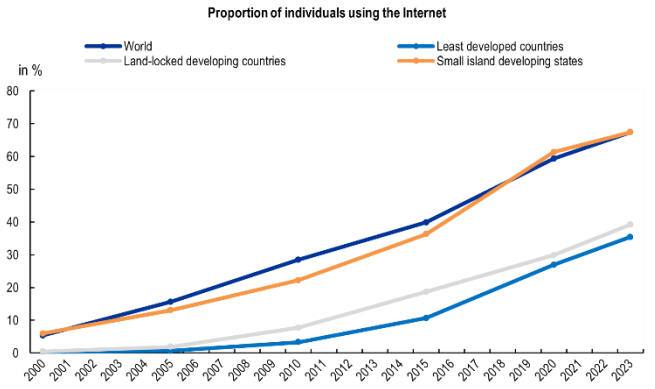


Source: Author's based on: UN ECOSOC (2024), Progress towards the Sustainable Development Goals, Statistical Annex

Global trade in ESTs, or technologies traded that are deemed environmentally sound according to specific sectors,[1] totalled USD 2.36 trillion in 2020, up 5% from USD 2.25 trillion in 2015. However, for LDCs, this trade declined by 43% from USD 15.28 billion in 2015 to USD 8.78 billion in 2020.

The share of the world population using the internet significantly increased since 2015.

From 2015 to 2023, the world experienced a nearly 70% growth in the proportion of individuals using the internet (from 40% to 67%). In LDCs, the growth rate was much



Source: Author's based on: UN ECOSOC (2024), Progress towards the Sustainable Development Goals, Statistical Annex

higher, increasing more than threefold from 11% to 35%.[2]

While the share of the population using the internet in countries most in need increased rapidly, universal connectivity remains a distant goal in LDCs and land-locked developing countries, where only 35% and 39% of the population, respectively, were online in 2023. In small island developing states, two-thirds of the population were online, in line with the global average.

Key performance indicators (selected quantifiable commitments). (The statistical annex contains the full list)

⇑ Total official development assistance (ODA) disbursements to science, technology and innovation (STI) increased from USD 7.69 billion in 2015 to USD 9.33 billion in 2022, reflecting 21.33% growth over this period.

⇑ The global coverage of at least a 3G mobile network for the population rose notably from 78% to 95% between 2015 and 2023, approaching universal access. Coverage in LDCs also grew significantly from 53.2% to 82.0% over the same period.

⇑ Fixed broadband subscriptions have steadily increased at an average annual growth rate of 6.4% between 2015 and 2023, reaching 19 subscriptions per 100 inhabitants in 2023 globally, compared to 11 in 2015. However, in LDCs , progress has been slower, with only 1.8 subscriptions per 100 inhabitants in 2023, up modestly from 0.8 in 2015.

⇓ The contribution of medium and high-tech manufacturing value added to the total value added have remained stable globally, accounting for 46.2% of the total value added in 2021, a similar level from 46.3% in 2015 and 45.8% in 2000. However, LDCs saw a sharp decrease in this proportion from 14.5% in 2000 to 9.1% in 2015 and only 8.4% in 2021.[3]

Resource mobilisation potential

- Increasing internet access to 75% of the population in developing countries would increase their GDP by USD 2 trillion and create 140 million new jobs.[4]
- Boosting women's participation in the science, technology, engineering and mathematics, or STEM, field could increase women's cumulative earnings by USD 299 billion over the next ten years.[5]

Key areas of progress

Progress is being made towards universal and affordable access to the internet by 2030

Bridging the digital divide will require efforts to improve digital connectivity globally. Approximately 67% of the world's population, or 5.4 billion people, were online in 2023, a nearly 50% increase since 2015 that was accelerated by the COVID-19 pandemic. Significant progress has also been made in mobile network coverage. The global population coverage of at least a 3G mobile network increased from 78% in 2015 to 95% in 2023, nearing universal access. LDCs also experienced substantial growth in coverage, from 53.2% to 82.0% over the same period.

Support to strengthen country-driven capacity building has increased

In 2022, development finance for capacity building and national planning reached USD 54.9 billion, a 50% increase over 2015, with significant support directed towards public administration, health and financial policy sectors. Support to health policies and administration in developing countries increased by 26%, to USD 6.5 billion, primarily in response to the COVID-19 pandemic. Knowledge sharing is central to South-South and triangular co-operation modalities. From 2019 to 2022, South-South co-operation activities grew by 64%, though their total volume decreased from USD 12.8 billion to USD 10.4 billion. Triangular co-operation activities increased substantially, rising 268% from USD 84.23 million in 2019 to USD 424.82 million in 2022.

International flows in support of STI have increased, in part due to increased funding of medical research and COVID-19 control

Total ODA disbursements to STI increased from USD 7.69 billion in 2015 to USD 9.33 billion in 2022, or 21.33% growth over this period.[6] Since 2015, the share of ODA to STI in the total ODA has generally increased, ranging from about 0.9% in 2015 to a peak of roughly 1.6% in 2018 before stabilising at 1.2% to 1.4% from 2019 to 2021. However, estimates of ODA in support of STI vary as there is no internationally agreed methodology. For example, one OECD study found that between 2010 and 2016, total development finance supporting STI, including concessional and non-concessional financing from official providers and private philanthropy, averaged USD 14 billion annually.[1]

Among STI sectors, research and/or scientific institutions and medical research consistently accounted for substantial portions of the total, each accounting for approximately 0.2% to 0.5% throughout these years. In 2022, total net ODA for basic health and medical research reached USD 21.1 billion, more than double the USD 10.5 billion in ODA they received in 2015 of . A significant portion of this assistance focused on COVID-19 control, accounting for 42% of ODA for basic health care, with USD 8.8 billion dedicated to this effort and USD 1.6 billion specifically for COVID-19 vaccine donations. The Access to COVID-19 Tools Accelerator (ACT-A) and its COVID-19 Vaccines Global Access, or COVAX, facility played crucial roles in distributing vaccines to low- and middle-income countries, although vaccine nationalism and delayed agreements limited the timely delivery of doses. By October 2022, only 25% of the population in low-income countries had received at least one vaccine dose in stark contrast to 72% in high-income countries. Disbursements from OECD Development Assistance Committee countries to developing countries in the information and

communications technology sector more than tripled from USD 68.9 million in 2015 to USD 246.0 million in 2022. Other categories, namely fishery research and educational research, remained smaller, each contributing less than 0.1% consistently from 2015 to 2021.[7]

Persistent challenging areas

The concentration of innovation and investment stifles technological progress in developing countries

Innovation activity has been highly concentrated in a few countries, with the top ten countries accounting for at least 87% of global patent applications. This concentration is even more pronounced in specific sectors: 90% of patenting activity in smart manufacturing occurs in just ten countries and industrial firms from just seven countries represent 90% of all patenting activity in green technology.[8][9] Additionally, there is a significant imbalance in health research funding, with developing countries bearing 90% of the world's disease burden but receiving only 10% of such funding.[10]

Global innovation trends, as tracked by the 2023 World Intellectual Property Organization's Global Innovation Index (GII), show that the results of investment in innovation were mixed in 2022. While scientific publications, R&D, venture capital deals and patents continued to grow, the growth rates were lower than the exceptional increases observed in 2021. The share of medium- and high-tech manufacturing value added globally remained relatively stable, at 45.07% in 2020 and 45.62% in 2000. However, this share decreased in LDCs from 16.10% in 2000 to 10.56% in 2022, highlighting a widening gap in technological advancement.[11]

An enhanced enabling environment and more strategic use of intellectual property rights could further unlock innovation, boost trade, attract investment and promote technological upgrading

Intellectual property rights have the potential to be a game changer for developing countries, including LDCs. For example, in Cambodia, the registration of premium pepper originating from Kampot as a geographic indication helped farmers more than triple their income since 2010; in Ethiopia, trademarking has contributed to a 275% increase in coffee exports since the early 2000s. However, an innovation gap persists: applications for trademarks averaged 2 197 annually between 2017 and 2021 in LDCs, far below the global average of 26 034 and the average of 24 789 in other developing countries. Annual applications in LDCs for patents and utility models, both of which protect inventors' rights, totalled just 55 and 24, respectively over the same period. LDCs, often are at the bottom of the GII rankings, also have the lowest level of productive capacities and readiness to harness frontier technology.[12]

The gender gap in global internet usage persists, despite progress towards parity

In 2022, 63% of women globally used the internet compared with 69% of men, with an even wider gap in lower-income countries where only 21% of women were online compared with 32% of men. In 2023, 65% of women and 70% of men worldwide used the internet. The gender parity score, which indicates parity when between 0.98 and 1.02, has improved from 0.90 in 2019 to 0.92 in 2023. However, this score does not fully capture the divide as women, who make up about half of the global population, increasingly represent a larger portion of those offline, with the gap between women and men not using the internet users at 17% in 2023, up from 11% in 2019.[13]

Countries most in need, particularly LDCs, still struggle to narrow costly digital divide

The Doha Programme of Action for the Least Developed Countries for the Decade 2022-2031 highlights STI alongside structural transformation as crucial for overcoming economic, social and environmental challenges facing LDCs. However, there are significant barriers. In LDCs, 18% of the population still lack access to a 3G mobile broadband and fixed broadband penetration remains low, with just 1.8 subscriptions per 100 inhabitants in 2023.[14] The cost of broadband access in many LDCs exceeds the affordability target set by the Broadband Commission for Sustainable Development, and only 35% of the population is currently online.[15] Despite a more than threefold increase in digital connectivity from 11% to 35% between 2015 and 2023, universal access remains a distant goal in LDCs.

Efforts to improve digital infrastructure face numerous challenges, including frequent internet shutdowns due to political and security issues as well as unreliable power systems and other infrastructure shortcomings. Moreover, there are significant barriers related to usability, cost-effective technology and financial constraints.[16] Of the 32 LDCs assessed on the GII, 21 are in the bottom quartile, underscoring a persistent lag in innovation and adoption of new technologies. This gap is exacerbated by limited infrastructure, insufficient financial and technical resources, and inadequate investment in education, skills development and STI R&D.

International mechanisms that have been established to facilitate technology transfer to countries most in need struggle with funding

The United Nations (UN) technology facilitation mechanism (TFM) was established by the Addis Ababa Action Agenda in 2015. The TSM consists of four key elements: the UN Interagency Task Team on STI for the SDGs, the 10-Member Group of High-level Representatives, the annual Multi-stakeholder Forum on STI for the SDGs and the online platform "TFM 2030 Connect," which serves as a central hub for accessing information on existing STI initiatives, mechanisms, and programs.[17] The TFM also supports the development of STI roadmaps. Six pilot countries (Ethiopia, Ghana, India, Kenya, Serbia and Ukraine) and two international partners (the European Union and Japan) have participated in the first phase of the programme since 2019.

The UN General Assembly agreed to establish the technology bank for LDCs on 23 December 2016.[18] However, the government of Türkiye is the sole volunteer donor of the Technology Bank, providing USD 1.7 million annually, an amount that covered only 60% of staff costs in 2023.[19]

Nonetheless, substantial efforts have been invested in technology transfer for climate. Technology-related climate development finance grew substantially from USD 13.3 billion in 2015 to USD 28.6 billion in 2019. During this period, the proportion of climate-related activities with a technology transfer component increased from 27% to 36%. Over the same period, mitigation-related technology transfer comprised 69% of the total technology-related climate development finance. The primary sectors targeted were energy, transport and storage, and agriculture. Debt instruments were the most frequently used financial tools for climate technology transfer projects, accounting for 68% of total development finance resources, while grants represented 30% and equity investments 2%.[20]

New and emerging areas

Renewable energy and climate technologies can help developing countries transition towards more circular and greener economies

Technological advances have significantly reduced the costs of some renewable energies, making them competitive with fossil fuels. For example, the cost of solar photovoltaic technology, which was 710% higher than that of fossil fuels in 2010, became 29% cheaper than the least expensive fossil fuel option by 2022.[21] While global trade in ESTs, or technologies that have the potential to significantly improve environmental performance relative to other technologies, increased from USD 2.25 trillion in 2015 to USD 2.36 trillion in 2020, total trade of ESTs in LDCs, dropping from USD 15.28 billion to USD 8.78 billion over the same period. The Global Environment Facility (GEF) remains the largest public sector funding source for transferring ESTs, with a record USD 5.33 billion pledged by 29 donor governments for its eighth replenishment cycle (2022-26), a 30% increase over the previous cycle.[22] Technology transfer has been a major component in most adaptation projects carried out by the GEF in LDCs, addressing climate resilience in diverse fields including water management, disaster risk management, food security and agriculture, coastal management, and infrastructure development.

A shared digital future: generative artificial intelligence, data privacy and safety

The artificial intelligence (AI) market could add USD 15.7 trillion to the world economy by 2030, with the greatest economic gains of 27% in China. [23] For developing countries, the AI market presents opportunities in precision agriculture, medical diagnostics, teacher support and virtual tutoring, and efficient use of water and energy.[24]

An analysis of 14 OECD countries indicates that the share of online vacancies requiring AI skills increased by 33% between 2019 and 2022.[25] Over 2000-21, nearly half of the 438 619 AI-related publications issued were published in three countries: China, the United Kingdom and the United States.[26] This dominance has left behind many countries, especially the least developed ones, which are often confined to the role of data providers.[27] Furthermore, AI technology present high-level risks, including the amplification of misinformation, increased harmful bias and discrimination, privacy breaches, and data governance risks at various levels.[28] To tackle these risks, the Global Digital Compact, adopted at the Summit of the Future, is an initiative to establish common principles for a secure, open and inclusive digital future.[29] It aims to address issues such as digital connectivity, internet fragmentation, data protection and the application of human rights in the online sphere.

Cybersecurity risks could cause disruption to financing for sustainable development

Cyberattacks are nearly twice as frequent as they were before the COVID-19 pandemic. While most reported losses from these attacks are relatively minor, averaging about USD 500 000, the potential for severe losses (of up to USD 2.5 billion) and systemic disruption has grown significantly.[30] Cyberattacks to the financial sector, in particular, could threaten economic stability by eroding confidence in the financial system, disrupting critical services or causing spillovers to other institutions. However, cybersecurity policy

frameworks, especially in developing countries, are often insufficient. For example, only about half of the countries surveyed by the International Monetary Fund reported having a national financial sector-focused cybersecurity strategy or dedicated cybersecurity regulations.[31]

Endnotes:

[1] EST sectors include air pollution control, wastewater management, solid and hazardous waste management, renewable energy, environmentally preferable products, water supply and sanitation, energy storage and distribution, and land and water protection and remediation. (UNSTATS)
[2] Author's based on: UN ECOSOC (2024), Progress towards the Sustainable Development Goals, Statistical Annex
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[4] World Bank (2022), Digital development: development news, research, data
[5] Council on Foreign Relations (2017), Girls' STEM Education Can Drive Economic Growth and HRForecast (2023), The STEM skills gap: a growing challenge for countries to overcome.
[6] Author's calculations based on OECD Data Explorer
[7] UN ECOSOC (2024), Global cooperation in science, technology and innovation for development
[8] UN ECOSOC (2024), Financing for Sustainable Development Report 2024
[9] UN ECOSOC (2024), Financing for Sustainable Development Report 2024
[10] (Suwanasri et al., 2015)
[11] WIPO (2023), The Global Innovation Index 2023 at a Glance
[12] UNCTAD (2024), Intellectual property: A potential game-changer for least developed countries
[13] Facts and Figures 2023 - The gender digital divide (itu.int)
[14] E_2024_54_Statistical_Annex_I_and_II.pdf (un.org)
[15] ITU (2023), Digital inclusion of all
[16] LSE (2022), Internet access as a tool for boosting economic and social equality
[17] TFM informal note by the Secretariat -17Oct2022 rev.pdf (un.org)
[18] UN General Assembly (2017), Resolution adopted by the General Assembly on 23 December 2016
[19] UN Technology Bank for Least Developed Countries (n.d.), Strategic Plan 2022-2024
[20] Technology transfer for Climate Mitigation and Adaptation (unepccc.org)
[21] UN ECOSOC (2024), Financing for Sustainable Development Report 2024
[22] GEF (n.d.), GEF-8 Replenishment
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[24] World Bank (2024), Developing AI for development
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[29] Global Digital Compact
[30] IMF (2024), Global Financial Stability Report: The Last Mile: Financial Vulnerabilities and Risks. Washington, DC
[31] IMF (2024), Global Financial Stability Report: The Last Mile: Financial Vulnerabilities and Risks. Washington, DC