Background

Series launched in 1993.
UNESCO Science Report 2010
5th in series
Next report due out in November 2015

« Sectoral reports, in focusing on the sectoral “state of the art”, shall provide different types of information, such as statistical data, comparative data between regions, pertinent analysis, policy and scientific developments, intellectual trends. » (UNESCO Executive Board, 2001)
Benefits

• Publication fills a unique niche
• Global coverage
• Vast amount of information and data on emerging trends and developments in science in a single publication
• Regular monitoring of situation every five years (which policies have been effective?)
• Enables sharing of experiences and best practices
• Authors are independent experts writing about their country or region – authoritative.
R&D remains dominated by a minority of countries.

Is the gap narrowing between developed and developing countries?

• **Yes:** 83% of R&D was conducted in the developed countries in 2002,
  • 76% in 2007;
• **BUT** R&D remains unevenly distributed. The Big Five – China, the European Union, Japan, the Russian Federation and the USA – represent:
  • one-third of the world population but
  • three-quarters of the world’s researchers and
  • three-quarters of world expenditure on R&D (GERD).

R&D is unevenly distributed *within countries*, both developed and developing:

• In Brazil, 40% of GERD is spent in the São Paulo region;
• South Africa’s Gauteng Province: 51% of GERD;
• In the USA, 59% of R&D was performed in 10 out of 50 states in 2005,
  one-fifth in California alone.
We are seeing a shift in global influence.

An unprecedented cycle of economic growth (1996-2007) fuelled a spending spree in R&D between 2002 and 2007:

- world GDP rose by 43%;
- world expenditure on R&D rose by 45%;
- Global R&D intensity (GERD/GDP ratio) remained stationary: 1.7%.
- In Brazil, R&D intensity progressed more slowly than the economy overall.

Behind this apparent stability in R&D effort, a lot has changed, driven by Asia:

Thanks largely to China (+3.9% world share), India (+0.6%) and the Republic of Korea (+0.8%), Asia’s share of world GERD rose from 27% to 32% between 2002 and 2007.

This came at the expense of Europe, North America and Japan, the traditional leaders of science (Japan’s share: 13.7% → 12.9%).

Business spending is growing fastest in Asia (China, Rep. of Korea, Singapore, Japan)

In China, 70.4% of spending on R&D is now financed by industry, close to Japan (77.7%) and Rep. of Korea (73.7%).

A spectacular rise in China also in researchers and publications:

Between 2002 and 2008, China doubled the number of researchers: 810 500 → 1.59 million
China is now second only to the USA for scientific articles recorded in the SCI. For citations, China is on a par with India.

“Today, the R&D intensity of high-tech industry remains much lower in China than in developed countries” (Chapter on China).
World shares of GERD, 2002 and 2007 (%)

Source: UNESCO Science Report 2010
World shares of researchers, 2002 and 2007 (%)

Source: UNESCO Science Report 2010
Persistent inequality in private knowledge production

*World shares of patents granted by the Triadic patent families, 2002 and 2006 (Figures for 2002 are within brackets).*

Source: UNESCO Science Report, 2010
An internationalization of science

This trend is being fostered by:

- Greater access to Internet;
- Greater recourse to “science diplomacy”;
- The cost of megaprojects (e.g. International Space Station, ITER);
- The desire to conquer new markets via international business consortia (e.g. Airbus);
- The implantation of R&D centres overseas by multinationals (facilitated by new digital technologies);
- The cross-border nature of many problems (e.g. pandemics; climate change, environmental degradation)
- Emerging economies are seeking to attract highly skilled research personnel from abroad
  - e.g. China is wooing expatriates and foreign experts
- The growing economic might of Brazil, China, India, South Africa and others is enabling them to invest in high-tech companies in developed countries.
  - e.g. when Tata Steel took over the British steel giant Corus (2007) it did not hold a single American patent. The takeover brought over 80 patents and almost 1 000 research staff.

This two-way flow of information, knowledge, technology, investment and personnel is leading to:

- stronger research collaboration (more international co-authorship, more partnerships)
- a more competitive environment.
A growing emphasis in STI policy on sustainability and green technologies

- A global trend;
- ICTs, biotechnologies, nanotechnologies remain common R&D priorities;
- Clean energy and climate research two emerging R&D priorities;
- Disaster forecasting/monitoring a growing priority
- Space science and technology becoming a focus of international collaboration, as developing countries seek to monitor their territory more closely, often via North–South or South–South collaboration.
USA: ‘Energy is this generation’s great project’ (President Obama, 2009). Intends to create Advanced Research Project Agency for Energy within Department of Energy.

China: 11th Five-Year Plan to 2010: mandatory objective of reducing energy consumption per unit of GDP by 20% and emissions of major pollutants by 10%. Local government leaders and entrepreneurs will be evaluated. One of five high-priority clusters in Outline of Medium- and Long-term Plan for National S&T Development (2006-2020) covers technologies in energy, water resources and environmental protection.


Nepal formed high-level Commission on Climate Change in 2009, under chairmanship of Prime Minister, to prepare action plan for adaptation.

Pakistan established Global Change Impact Studies Centre in 2002 for research on impact of climate change on agriculture, water resources, environment, biodiversity, health, energy.

Australia has defined Sustainable Australia as a research priority, includes a Sustainable Agriculture programme ‘in a carbon constrained world.’

In Fiji, foreign donor funds are being directed towards sustainable agriculture and forestry.

In Morocco, an industrial park for clean energy was under construction in 2010. It will support private investment in renewable energy.

Sudan: In June 2009, it inaugurated its first biofuel plant, built with Brazil (Dedini), and, with Egypt, is exploring second-generation biofuels (US$150, million)
Research and development: USA, Europe and Japan increasingly challenged by emerging countries, says a UNESCO report (AR, EN, ES, FR, RU, CH)

Asia leaping forward in science and technology, but Japan feels the global recession, shows UNESCO report (EN, CH)

Science and technology could be the way to greater equality in Latin America, says UNESCO report (EN, ES)

Even oil-rich Arab states need innovation, says UNESCO report (EN, AR)

Research and development: Africa is making progress despite major challenges (EN)
Global science
Climbing Mount Publishable

The old scientific powers are starting to lose their grip

Nov 11th 2010 | from the print edition

TWOFTY years ago North America, Europe and Japan produced almost all of the world's science. They were the aristocrats of technical knowledge, presiding over a centuries-old regime. They spent the most, published the most and patented the most. And what they produced fed back into their industrial, military and medical complexes to push forward innovation, productivity, power, health and prosperity.

All good things, though, come to an end, and the reign of these scientific aristos is starting to look shaky. In 1990 they carried out more than 95% of the world’s research and development (R&d). By 2007 that figure was 76%.

Such, at least, is the conclusion of the latest report* from the United Nations Educational, Scientific and Cultural Organisation, UNESCO. The picture the report paints is of a waning West and a rising East and South, mirroring the economic shifts going on

“A wonderful article about UNESCO in The Economist!”

Director,
UNESCO office,
New York
12 November 2010
Report’s findings foster information and data-sharing

Report prepared by German Federal Ministry for Training and Research within EU project to expand scientific collaboration between Europe and Southeast Asia. The report summarizes country studies of ASEAN countries from the *UNESCO Science Report 2010*. 

The findings emphasize the importance of fostering information and data-sharing within the ASEAN region. The report highlights the role of scientific collaboration in enhancing technological and economic development. Key findings include the need for further inter-regional engagement and the importance of aligning research priorities with regional needs. The report also underscores the significance of partnerships between universities, research institutions, and industry sectors in driving innovation.
Report inspired World Science Forum theme

The Changing Landscape of Science
This new UNESCO report is definitely interesting, as it offers a mine of information on global science and technology, as well as on research and innovation policies, but the reader will no doubt still feel hungry for more… We may share the view of the UNESCO experts that the model governing the contribution of knowledge to economic growth is on the verge of a structural break on account of the rise of multinationals in emerging economies, which are now also delocalising.

But shouldn’t we also ask ourselves whether Western science policies can effectively be transposed to developing countries. (The author of the chapter on Japan wonders whether it was pertinent for Japan to base its university reform on the system of centres of excellence in Europe and the USA.) »
« The indicators reveal the existence of two worlds when it comes to research (with the producers of knowledge on the one side and poor countries with a serious handicap in science, on the other).

Shouldn’t we be asking ourselves what the consequences are of such imbalances (many developing countries lack the requisite scientific expertise to influence global debates on climate and energy)? The report does not tackle this question, nor the problems posed by intellectual property. »

« This report will no doubt become a reference, but it also shows that there is a lot of work to be done to bridge the gaps when it comes to the development of research and innovation potential around the world. »

Pierre Papon
Cost$: was it worth it?

- The *UNESCO Science Report* 2010 cost about US$630,000 over a period of 2 years.

- Approx. US$350,000: 1 part-time editor and 1 part-time administrative assistant (UNESCO staff)

- Approx. US$200,000: author’s contracts, design and layout, purchase of statistical data, printing and a summary of the report in the six UN languages; free distribution.

- Approx US$80,000: UNESCO Institute for Statistics (UNESCO staff)

- This budget was insufficient.
Consequences of budgetary shortfall

Skeleton staff, so 2 years needed to produce report, with data and text updated before publication for earliest chapters

• Some countries not covered

• No other language editions

• Small budget for promotion and free distribution
Thank you

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