

UNESCO Science Report 2010

This document is a summary of the UNESCO Science Report 2010. It was released by InterInnov on the 18 April 2011.

The UNESCO Science Report 2010 takes up from where its predecessor left off five years ago. Its aim is to provide a global overview of developments over the past five years. First of all, since 2005, cheap and easy access to new digital technologies such as broadband, Internet and mobile phones have accelerated the diffusion of best-practice technologies, revolutionized the internal and external organization of research and facilitated the implantation abroad of companies' research and development (R&D) centres. Secondly, countries have been catching up rapidly in terms of both economic growth and investment in knowledge. Thirdly, the impact of the global recession on a post-2008 world is not yet reflected in the R&D data but it is evident that the recession has, for the first time, challenged the old North–South technology-based trade and growth models.

Pre-recession facts and figures

The world devoted 1.7% of GDP to R&D in 2007, a share that has remained stable since 2002. In monetary terms, however, this translates into US\$ 1 146 billion⁶, an increase of 45% over 2002. This is slightly higher than the rise in GDP over the same period (43%). Driven largely by China, India and the Republic of Korea, Asia's world share has risen from 27% to 32%, to the detriment of the Triad. Most of the drop in the European Union (EU) can be attributed to its three biggest members: France, Germany and the United Kingdom (UK). Meanwhile, the shares of Africa and the Arab States are low but stable and Oceania has progressed slightly.

Increasingly, multinational companies are decentralizing their research activities to parts of both the developed and developing worlds within a strategy to internalize R&D at the global level. For multinationals, this strategy reduces labour costs and gives companies easier access to markets, local human capital and knowledge, as well as to the host country's natural resources. The favoured destinations are the so-called Asian 'tigers', the 'old' newly industrialized countries in Asia, and, secondly, Brazil, India and China.

China is on the verge of overtaking both the USA and the EU in terms of sheer numbers of researchers. These three giants each represent about 20% of the world's stock of researchers. If we add Japan's share (10%) and that of Russia (7%), this highlights the extreme concentration of researchers: the 'Big Five' account for about 35% of the world population but three-quarters of all researchers. The USA is still the country which leads the world when it comes to scientific output in absolute terms. However, its world share (28%) has fallen more than any other country over the past six years. The leading region for this indicator, the EU, has also seen its share dip by four percentage points to less than 37%. By contrast, China's share has more than doubled in just six years and now represents more than 10% of the world total, second only to the USA, even if the citation rate for Chinese articles remains much lower than for the Triad. Next come Japan and Germany.

Global economic recession and knowledge creation

The global recession is likely to have had a severe impact on investment in knowledge across the globe. R&D budgets, especially, tend to be vulnerable to cutbacks in times of crisis. However, between October 2008 and March 2009, the first signs of recovery appeared. Asia in general and



China in particular were the first to recover. It is unlikely that R&D expenditure in China has been affected by the global economic recession because industrial production fell only 7% below its long-term trend value for a relatively short period. Moreover, circumstantial evidence on firms provided by the EU's R&D investment scoreboard in 2009 shows that China's R&D effort in 2008 actually increased, at least in telecommunications. There is no reason to assume that 2009 and 2010 will be much different, since China's economy grew by more than 7% even in 2007 and 2008.

As for the world's largest R&D-intensive firms, circumstantial evidence for 2009 reveals that the majority of the big R&D spenders in the USA cut their R&D expenditure by 5–25% that year, while a minority increased spending by 6–19%. Overall though, the USA and EU are most likely to keep their total R&D intensity at around 2007 levels. This means that both GDP and R&D expenditure will decline by equal shares, thereby keeping R&D intensity more or less constant over the year 2009–2010.

Concerning individual countries

- In the United States of America, R&D has prospered over the past five years and continues to be an absolute government priority. Although the recession born of the subprime crisis hit the economy hard in 2009 and 2010, universities and research centres have continued to receive generous funding from both public funds and private endowments and industrial funds. However, unlike public research, industrial R&D appears to have been hit relatively hard by the recession with a large number of researchers being laid off.
- Brazil experienced a booming economy in the years leading up to the global recession. Such a healthy economy should be conducive to business investment. However, patent numbers remain low and R&D activities sluggish in the business sector, leaving most of the funding effort to the public sector (55%);
- Cuba's human development is among the highest in the region, on a par with Mexico. In terms of overall spending on S&T, however, it has slipped below the regional mean;
- The European Union is increasingly a heterogeneous group of countries. Although the new member states are catching up in economic terms, there remains a yawning gap between the richest and poorest member states. Although the EU is the undisputed world leader for publications recorded, it is struggling to increase expenditure on R&D and develop innovation;
- Turkey's business expenditure on R&D grew by 60% between 2003 and 2007. However, challenges remain: the density of researchers remains poor and enrollment in tertiary education is lower than for countries with a similar income. Turkey also has an underdeveloped venture capital market and an insufficient number of high-growth firms.
- The Russian Federation had been experiencing an economic boom in the years before the severe economic downturn towards the end of 2008. Currently, there is a lack of co-ordination across departments, a high level of administrative complexity and poor linkages between science, academia and industry;
- India is one of the world's fastest-growing economies, alongside China. Having been relatively spared by the global recession, it is pursuing a path of rapid growth. The past few years have seen a rise in private investment in R&D, with the majority of new companies belonging to knowledge-intensive sectors.
- China has made great strides in economic development in the past decade with consistently impressive growth rates. Its R&D intensity has also been multiplied by a factor of six. Today, the main barriers to innovation are the rapidly growing innovation risk that enterprises face, the lack of support for systemic innovation and exploration, and weak market demand for innovation;



- Japan was hit hard by the global recession in 2008. After stagnating at around 2% between 2002 and 2007, growth in GDP dropped below zero, plunging major companies into distress and resulting in bankruptcies and a surge in unemployment rates.

Key messages

The disparity in development levels from one country and region to another remains striking. However, the past five years on which the present UNESCO Science Report focuses have really begun to challenge the traditional leadership of the USA. The USA has been harder hit than Brazil, China or India, thereby enabling these three countries to progress faster than they would have done otherwise.

Moreover, there is a growing emphasis in STI policy on sustainability and green technologies. This holds not only for clean energy and climate research but also for the repercussions on S&T fields upstream. Space science and technology are being harnessed to provide ICT infrastructure for use in wireless applications in health, education and other fields. Climate change-related research has emerged as an R&D priority when it was almost totally absent from the UNESCO Science Report 2005.