Today, there are fewer grounds than in the past to deplore a simple ‘North–South’ divide in research and innovation.

A large number of countries are now incorporating science, technology and innovation in their national development agenda. More governments are coming to realize that their plans to diversify and modernize the economy will be thwarted, if they cannot call upon a critical mass of skilled personnel, including scientists, engineers and technicians, to drive an economy that is to be less reliant on raw materials and more rooted in knowledge.

Despite the economic and financial crisis of 2008–2009, expenditure on research and development rose by 30.5% between 2007 and 2013, more than global gross domestic product (up 20%). There has been a convergence in the level of public commitment to R&D in the past five years. Whereas wealthy countries have cut back their commitment as part of a wider austerity drive, lower income countries (e.g. Kenya) have stepped up their own public commitment. This convergence is not yet visible in the global data for research expenditure because the business sector in higher income countries has maintained or increased its own spending on R&D, despite the crisis.

The number of researchers worldwide progressed by 21% between 2007 and 2013. Less than one-third of researchers are women (28%), on average, but a growing number of countries are putting policies in place to correct this imbalance. Moreover, the greatest shares of female researchers are not always to be found in the most developed regions: in Latin America and the Caribbean, for instance, 44% of researchers are women and, in the Arab States, 37%, compared to 33% in the European Union.

The number of scientific publications worldwide progressed by 23% between 2008 and 2014 but the growth rate was much higher in upper middle-income (95%) and low-income (68%) countries. We are witnessing an ongoing process of ‘multipolarization’ of scientific production, research and innovation. Scientists are not only publishing more in internationally catalogued journals but also co-authoring a greater share of papers with foreign partners. Internet is fostering ‘open access’ to information and data. Several middle-income countries are becoming hubs for nanotechnology – or harbour this ambition –, including Brazil, China, India, Iran, Malaysia and the Russian Federation.

Most R&D is taking place in high-income countries but innovation of some kind is now occurring across the full spectrum of income levels. This innovation may take the form of R&D, or manifest itself, for example, in the acquisition of related equipment. According to a survey of manufacturing firms in 65 countries of various income levels conducted by the UNESCO Institute for Statistics in 2013, summarized in the report, more than half of the firms surveyed were engaged in innovation unrelated to R&D.

Science is becoming more mobile

The number of international students rose by 46% between 2005 and 2013: from 2.8 million to 4.1 million. Countries are striving to attract and retain talent to drive the knowledge economy to which they aspire or to maintain their international competitiveness. It is not a coincidence that the USA,
the UK and France host the largest contingents of international PhD students in science and engineering. Perhaps more surprisingly, governments themselves are accompanying this movement. A number of countries of different income levels are now fostering the greater international mobility of their graduate students through scholarships and other means, to ensure that they acquire a wide spectrum of skills and experience (e.g. European Union, Brazil, Saudi Arabia, Viet Nam). The European Union is even planning to instigate a ‘scientific visa’ to facilitate mobility around Europe. In parallel, countries are upgrading their own higher education and research infrastructure. Studies conducted across Europe have shown that a high level of mobility by qualified personnel across countries and between the public and private sectors contributes to the overall professionalism of the labour force, as well as to the innovative performance of the economy.

This trend towards greater scientific mobility is accompanied by another: the growing number of private firms that are relocating their research laboratories abroad. Although universities are collaborating much more internationally than before, their infrastructure tends to be less physically mobile than that of private firms, with only a minority setting up campuses abroad. The private sector thus has a potentially considerable role to play in spreading the ‘resource balance’ in science and technology around the world.

Science powers commerce – but not only

Faced with a moribund economy, it can be tempting to divert public resources towards commercial applications, to the detriment of basic research and public good science. Governments in high-income countries need to recognize that ‘science powers commerce – but not only,’ in the words of one of the report’s authors. It is a question of balance. A sustained public investment in basic and high-risk research makes economic sense, since neglecting them leads to a smaller pool of new knowledge, which, in turn, means that there will be less science to commercialize in the years to come. Switzerland, for example, is a global innovation leader but also devotes about 30% of R&D expenditure to basic research.

As predicted in the UNESCO Science Report 2010, international diplomacy has increasingly taken the form of science diplomacy in recent years. Countries at all stages of development stand to gain from this trend but the spirit of co-operation and solidarity that has characterized development partners up until now must be preserved. Trade relations are important but international relations must not be confined to trade. Achieving many of the Sustainable Development Goals (Agenda 2030) will depend not only on the diffusion of technology but also on how well countries partner with one another in the pursuit of science to solve pressing social and environmental problems and to ensure that nobody is left behind.

A growing tendency for governments and firms to invest in sustainable technologies

The UNESCO Science Report 2010 had observed a paradigm shift towards greener growth. It is evident from the current report that this trend has since accelerated and is seducing an ever-greater number of countries, even if levels of public investment may not always be commensurate with ambitions. Partly as a result of the commodities boom over the past decade, countries have become more aware of the value of their natural capital. Those that have anticipated the end of this cyclical boom in commodities are already implementing strategies to diversify their economies, in order to reduce their dependence on fluctuating global market prices for raw materials. In many countries, this strategy focuses on developing a knowledge economy.
For many developing countries, sustainable development is an integral part of their national development plans for the next ten to twenty years. National and regional policy orientations may also be inspired by the desire to develop coping strategies to protect agriculture, reduce disaster risk and/or ensure energy security, such as by diversifying the national energy mix and improving energy efficiency. Even some oil-rent economies have invested in renewable energy in recent years, such as Algeria (solar and wind). Most of the social innovation observed in East and Central Africa since 2009 tackles pressing development issues, such as overcoming food insecurity, mitigating climate change or the transition to renewable energy. Around the world, there is a growing tendency to develop futuristic hyper-connected smart cities or ‘green’ cities which use the latest technology to improve efficiency in water and energy use, construction materials, transportation and so on.

Among high-income countries, a firm commitment to sustainable development is often coupled with the desire to maintain competitiveness in global markets that are increasingly leaning towards green technologies. This is the case, for example, in the European Union, Japan and the Republic of Korea. Mitsubishi Heavy Industries in Japan, for instance, has developed a jet airliner which it hopes will conquer the global market, thanks to its high fuel efficiency, low environmental impact and minimal noise. The company began developing the aircraft in 2003, after the Ministry of the Economy, Trade and Industry announced that it would subsidize such an undertaking.

From 10 November 2015 on, the UNESCO Science Report - Towards 2030 and related resources will be freely accessible to all on the UNESCO Science Report page.

Media contact:

Agnès Bardon
UNESCO Press Office
a.bardon(at)unesco.org; + 33 (0) 1 45 68 17 64