UNESCO Institute for Statistics *Fact Sheet*

October 2007, No. 05

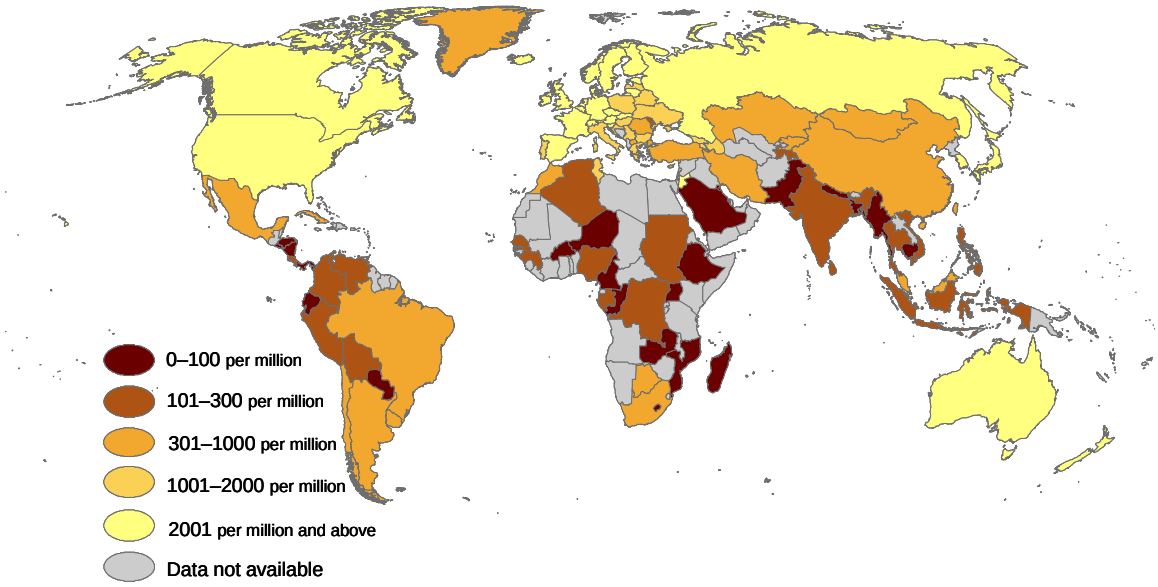
A global perspective on research and development

The UNESCO Institute for Statistics (UIS) works with governments and diverse organizations to provide global statistics on science and technology. The Institute also helps to ensure that survey instruments accurately reflect the conditions surrounding research and development (R&D), especially in developing countries. The aim is to provide the information needed for effective policymaking.

Human resources in R&D

Figure 1 presents a global map of the distribution of researchers (measured per million inhabitants). Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems (*Frascati Manual*, 2002).

Figure 1: How many researchers are there?
Researchers per million inhabitants, 2005 or latest available year



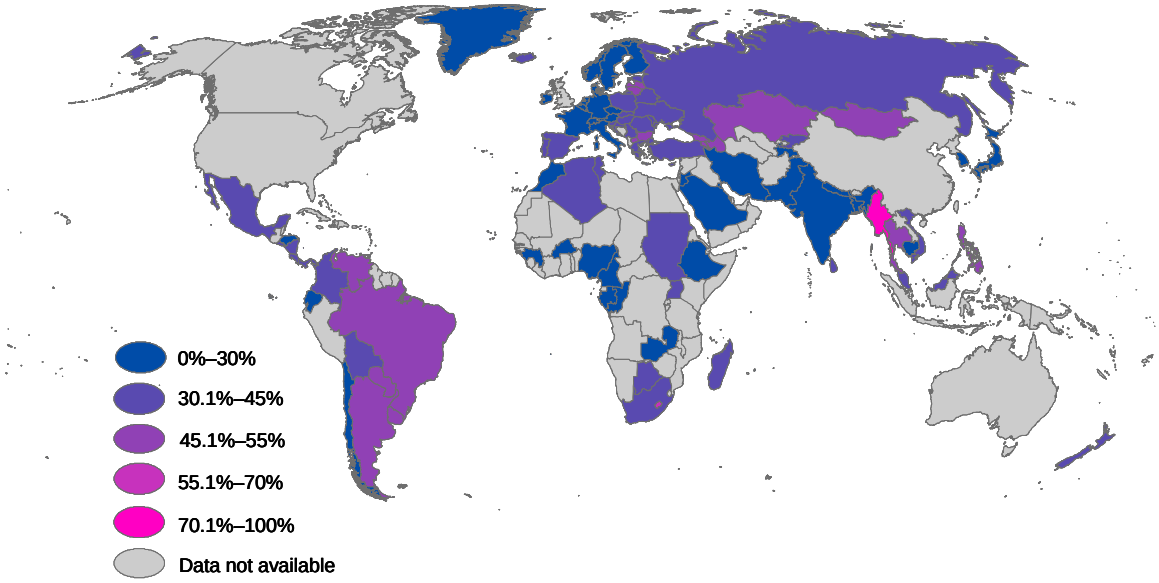
Note: About 70% of countries report full-time equivalents, the remaining use headcounts.
Source: UNESCO Institute for Statistics, September 2007.

Women in science

In 103 countries with available data[1], women represent slightly more than one-quarter of researchers. In 40% of these countries, they represent less than one-third. Only about 17% of countries have achieved gender parity, and only a handful of others have more women researchers than men.

Figure 2: The gender gap in science

Women as a share of total researchers, 2005 or latest available year



Source: UNESCO Institute for Statistics, September 2007.

According to UIS data illustrated in **Figure 2**:

- In Latin America and the Caribbean, 43% of researchers are women, exceeding the world average of 28%. Five countries have achieved gender parity: Argentina, Brazil, Paraguay, Uruguay and Venezuela. In contrast, men account for more than 70% of researchers in Chile, Ecuador, Honduras and the U.S. Virgin Islands.
- In Asia, women constitute only 17% of researchers. But there is considerable heterogeneity:
    - South Asia has the lowest rate of 16%, mostly due to the size of India (12%).
    - Less than 30% of researchers are female in the Asian Arab States, as well as Japan and Korea.
    - South East Asia reports a high share of female researchers at 41%.
    - Most Central Asian countries with data report gender parity (around 50%).
- In Europe as a whole, only four countries have achieved gender parity: Bulgaria, the Former Yugoslav Republic of Macedonia, Latvia and Lithuania.
- In the Commonwealth of Independent States, women's participation in research is much higher - 43% - than the world average.
- In Africa, it is estimated that about 31% of researchers are women.

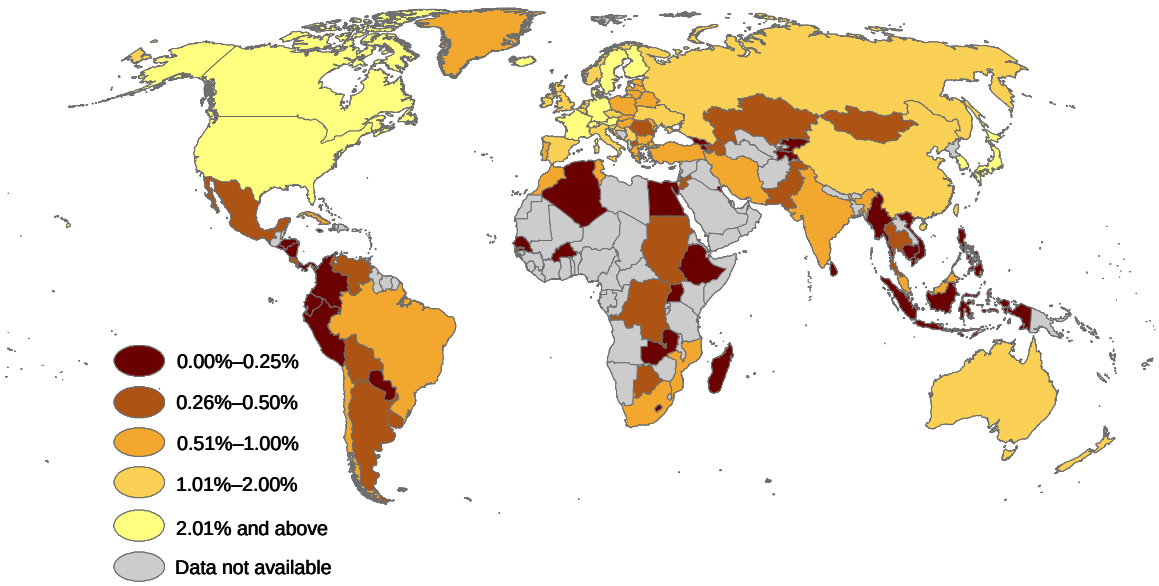
[1] Many countries with significant numbers of researchers - such as Australia, Canada, China, the United Kingdom and the United States – use full-time equivalencies for this indicator. However, the UIS and other organizations rely on headcounts, which are used for internationally comparable data.

How much are countries investing in R&D?

Governments are increasingly referring to international benchmarks when defining national science policies and allocating resources. In this context, **Figure 3** illustrates the percentage of gross domestic product (GDP) devoted to R&D activities. This indicator reflects a country's R&D intensity by presenting R&D expenditure relative to the size of the national economy.

Figure 3: A snap-shot of R&D intensity

Gross domestic expenditure on R&D (GERD) as a percentage of GDP, 2005 or latest available year



Source: UNESCO Institute for Statistics, September 2007

According to the latest statistics:

- Most countries spend between 0.25% and 1% of GDP on of R&D.
- R&D intensity in sub-Saharan Africa is generally less than 0.3%, with the exception of South Africa, which invests 0.9%. (Less than one-half of the countries in Africa can provide data.)
- In Latin America, Brazil reported the highest level of R&D intensity (0.9%), followed by Chile and Cuba (0.7% and 0.6% respectively). Spending levels in Argentina, Costa Rica and Mexico were about 0.4% of GDP.
- The top investors in East Asia are: Japan (3.2% in 2004), the Republic of Korea (3.0%) and Singapore (2.4%).
- China reported spending 1.3% of GDP on R&D, while India, the Islamic Republic of Iran and Malaysia invested between 0.7% and 0.6% of GDP.
- The figures range from 0.1% to 0.3% in Central Asia.
- In the Pacific, Australia and New Zealand invested 1.8% and 1.1% of GDP respectively.
- In Europe, R&D intensity varies from 0.2% of GDP in the Former Yugoslav Republic of Macedonia to 4.9% in Israel, followed by 3.5% and 3.9% in Finland and Sweden respectively. The figure ranges from 2% to 3% in Austria, Denmark, France, Germany, Iceland and Switzerland.
- In North America, the United States and Canada spend 2.7% and 2% of GDP respectively.

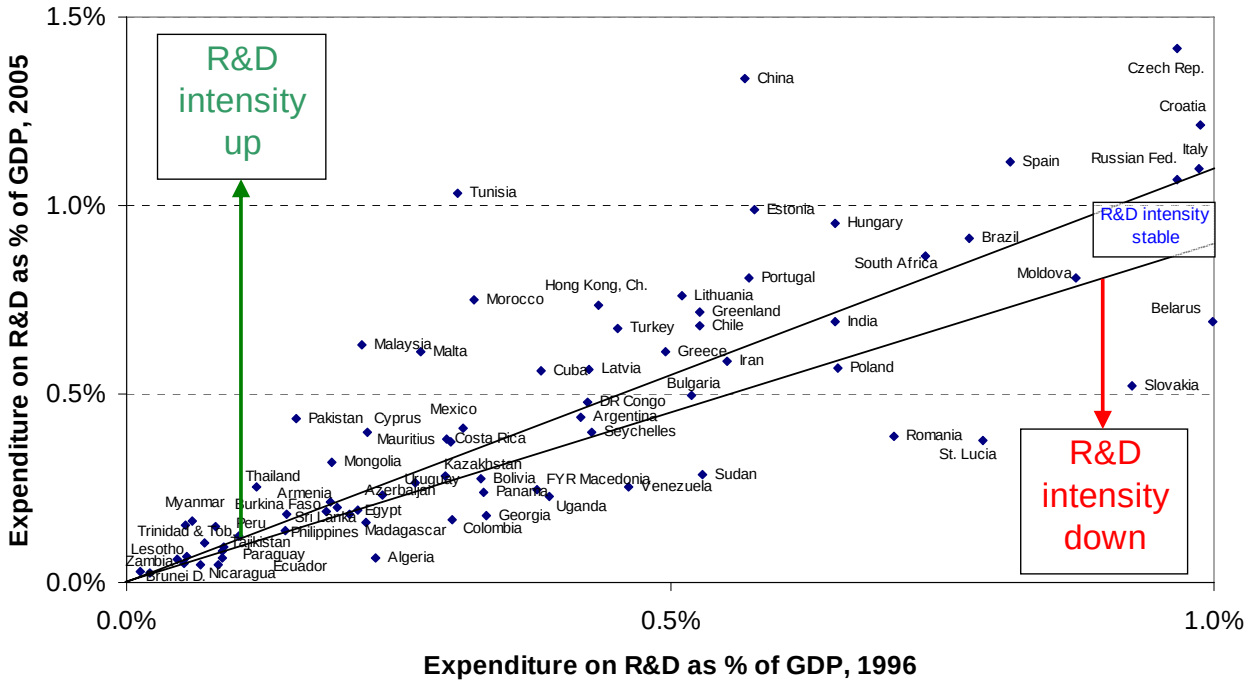
How has R&D intensity changed over the last ten years?

Figure 4 illustrates trends in R&D between 1996 and 2005:

- Globally, the percentage of GDP devoted to R&D has significantly increased in most countries (48 out of 89 with available data).
- R&D intensity has more than doubled in 9% of the countries surveyed, including China, Malaysia, Morocco, Pakistan, Thailand and Tunisia.
- In one-third of the countries, R&D intensity has been generally stable, although it has fallen in 15 countries (17%).

Figure 4: The evolution of R&D intensity

GERD as a percentage of GDP, 1996 (or earliest available year) and 2005 (or latest available year), countries with R&D intensity below 1.5% in 2005.



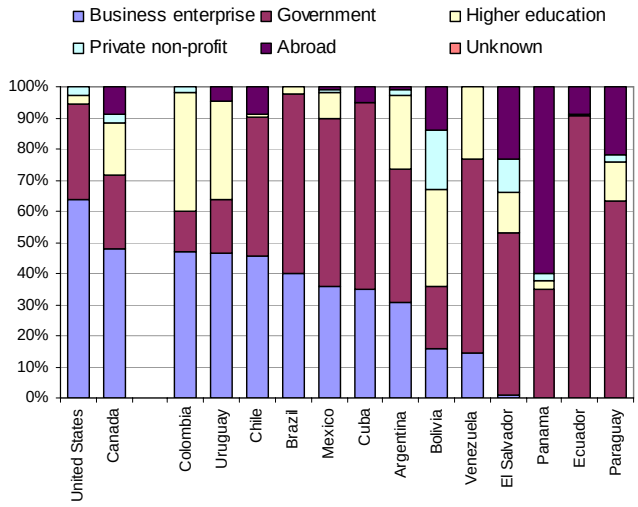
Source: UNESCO Institute for Statistics, September 2007

Which sectors invest the most in R&D?

Figures 5, 6 and **7** provide regional perspectives on the sources of R&D investment. The indicator reflects the percentage of total investment originating from the business sector, government, higher education institutions, private non-profit organizations or from abroad.

Figure 5: Funding in the Americas

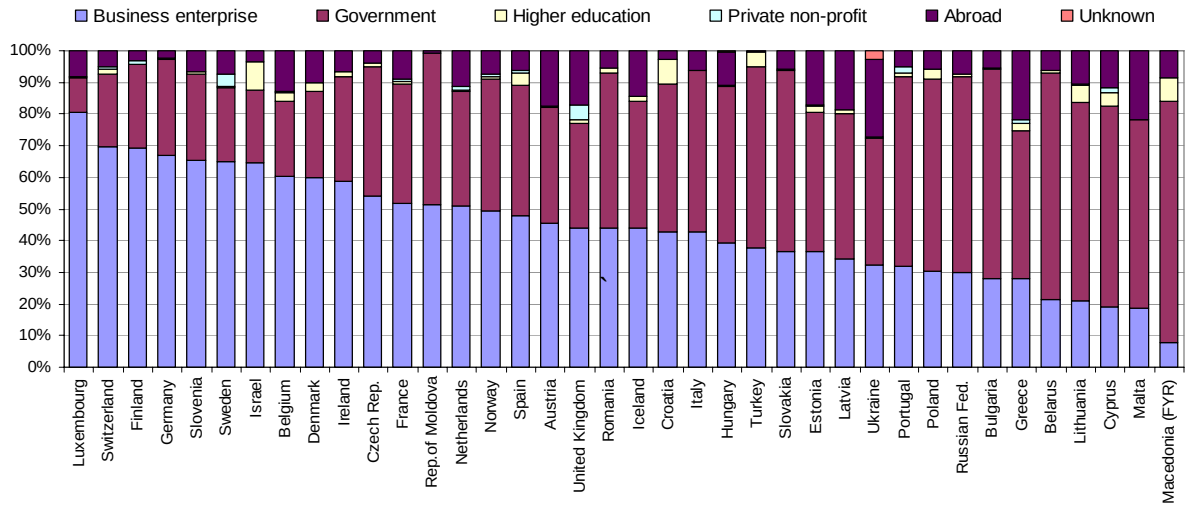
GERD by source of funds, 2005 or latest available year



Source: UNESCO Institute for Statistics, September 2007.

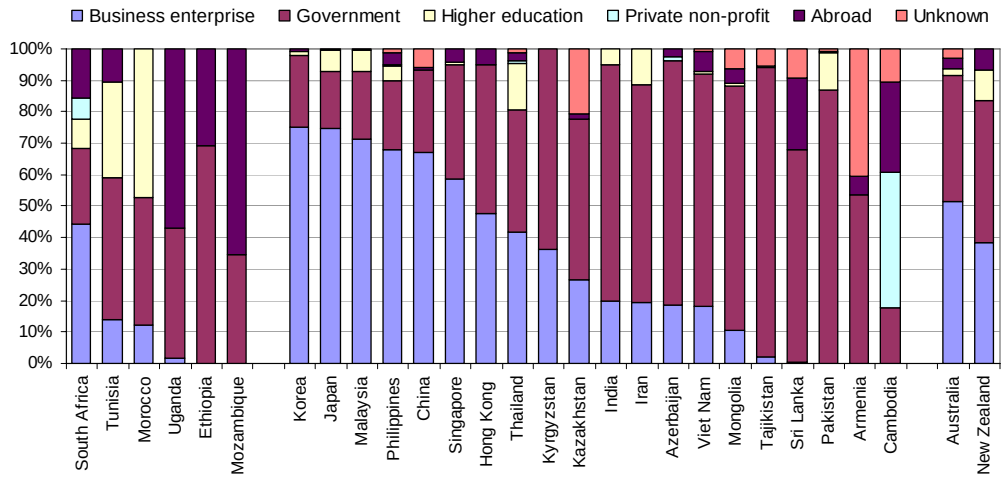
Figure 6: Funding in Europe

GERD by source of funds, 2005 or latest available year



Source: UNESCO Institute for Statistics, September 2007.

Figure 7: Funding in Africa, Asia and the Pacific
GERD by source of funds, 2005 or latest available year



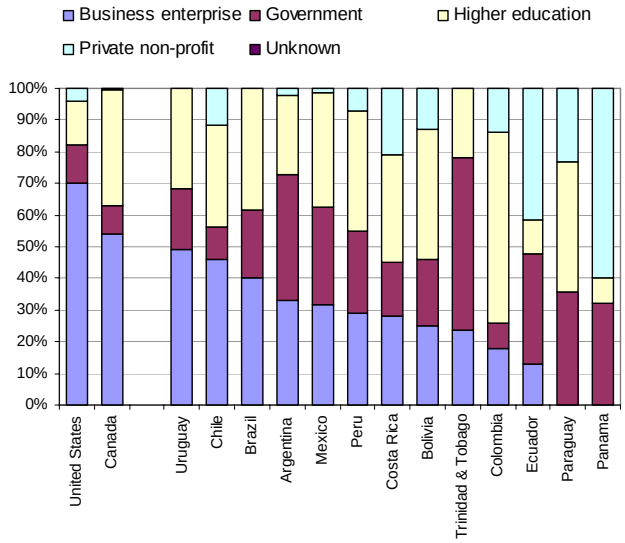
Source: UNESCO Institute for Statistics, September 2007.

Which sectors receive the most investment?

Are financial resources concentrated in the private or public sector? What about funding for research conducted by higher education institutions?

Figures 8, 9 and **10** show how R&D investment is spent by key sectors: business, government, higher education institutions or private non-profit organizations. The figures are based on total available resources, irrespective of their source.

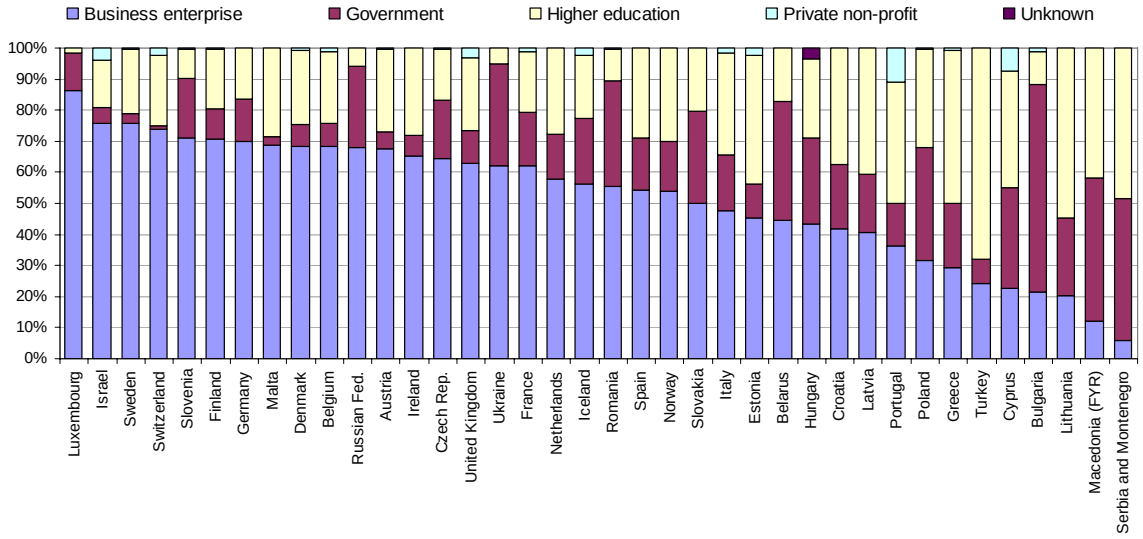
Figure 8: A breakdown of R&D investment in the Americas
GERD by sector of performance, 2005 or latest available year



Source: UNESCO Institute for Statistics, September 2007.

Figure 9: A breakdown of R&D investment in Europe

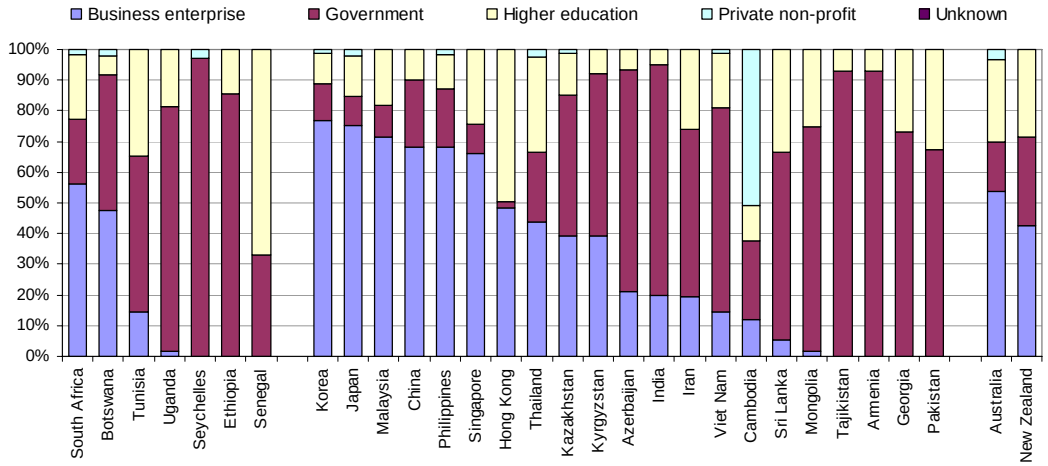
GERD by sector of performance, 2005 or latest available year



Source: UNESCO Institute for Statistics, September 2007.

Figure 10: A breakdown of R&D investment in Africa, Asia and the Pacific

GERD by sector of performance, 2005 or latest available year



Source: UNESCO Institute for Statistics, September 2007.

Conclusions

- R&D expenditure has grown worldwide between 1996 and 2005.
- Most developing countries invest less than 1% of GDP in R&D, but there are some notable exceptions such as China and Tunisia, which have significantly increased their investment during the last 10 years.
- In most developed countries, R&D activities largely financed and conducted by the business sector. Yet, the public sector plays a major role in most developing countries.
- Globally, women account for slightly more than one-quarter of researchers.
- There is a clear need to collect and analyze quality S&T statistics, especially in developing countries, to support evidence-based policymaking at the national and international levels.

For more information, please consult the UIS website at www.uis.unesco.org to access the database and subscribe to an email alert service concerning the Institute's latest publications and data releases.