

Human resources in science and technology (HRST) are major actors in innovation. In most OECD countries, they represented more than a quarter of total employment in 2008. The share was even larger in northern Europe (39.6% in Sweden, 39.1% in Denmark, 38.0% in Norway, 34.2% in Finland) but also in Australia (35.8%), Canada (35.5%) and the United States (32.3%). There is no single pattern in terms of the split between professionals and technicians: in some countries professionals are more numerous than technicians (Belgium, Ireland and Luxembourg); in others the opposite is true (Czech Republic, Italy and Norway).

A particular characteristic of HRST employment is the increasing share of women. Indeed, except in Turkey, where they only represent 34.2%, women are traditionally more numerous than men among HRST employees in OECD countries. In Hungary, Poland and the Slovak Republic, 60% of HRST in 2008 were women.

A look at the industry structure of employment shows that HRST employees are more concentrated in services than in manufacturing. In 2007, the share of professionals and technicians in services varied between 19.6% (in Japan) and 44.1% (in Luxembourg), whereas in manufacturing they were about 18% on average in OECD countries for which data were available.

Over the past decade, HRST occupations increased more rapidly than total employment in most OECD countries. In services, the average annual growth rate has always been positive, ranging from 1.1% (in the United States) to 6.3% (in Spain). However, in manufacturing, the share of professionals and technicians decreased in Luxembourg (-2.1%), the United States (-1.3%), Japan (-1.2%) and Sweden (-0.5%). In Australia, both growth rates were stable over 1997-2007.

Defining HRST workers

Human resources in science and technology (HRST) are defined according to the *Canberra Manual* (OECD and Eurostat, 1995) as persons having graduated at the tertiary level of education or employed in a science and technology occupation for which a high qualification is normally required and the innovation potential is high.

HRST data reported here only concern occupations. This category of workers corresponds to professionals and technicians as defined in the International Standard Classification of Occupations (ISCO-88) major groups 2 and 3:

- Professionals (ISCO group 2) includes: physical, mathematical and engineering science professionals (physicists, chemists, mathematicians, statisticians, computing professionals, architects, engineers); life science and health professionals (biologists, agronomists, doctors, dentist, veterinarians, pharmacists, nursing); teaching professionals; and other professionals (business, legal, information, social science, creative, religious, public service administrative).
- Technicians and associate professionals (ISCO group 3) includes: physical and engineering science associate professionals; life science and health associate professionals; teaching associate professionals; other associate professionals (finance, sales, business services, trade brokers, administrative, government, police inspectors, social work, artistic entertainment and sport, religious).

The original data were collected according to the following industry classifications: European Union (NACE Rev. 1), Canada (NAICS 2002-Canada), Japan (JISIC 2002), United States (NAICS 2002-US), Australia (ANZSIC 1993). They have then been converted to ISIC Rev. 3 for the ANSKILL database.

The industry groupings analysed here are: Manufacturing (ISIC 15 to 37); Services (ISIC 50 to 99).

Source

OECD ANSKILL Database, 2009 (forthcoming).

Going further

OECD and Eurostat (1995), "Manual on the Measurement of Human Resources Devoted to S&T - 'Canberra Manual'", OECD general distribution document, OCDE/GD(95)77, www.oecd.org/dataoecd/34/0/2096025.pdf.

Figure notes

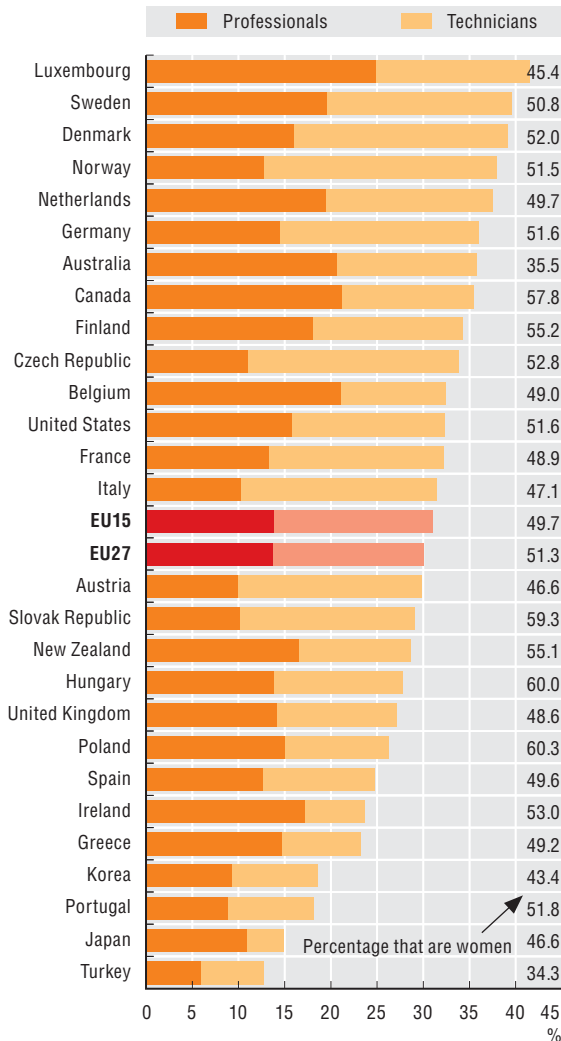
Total HRST for Japan are likely to be underestimated.

5. INVESTING IN THE KNOWLEDGE ECONOMY

5.3. Human resources in science and technology

HRST occupations, 2008

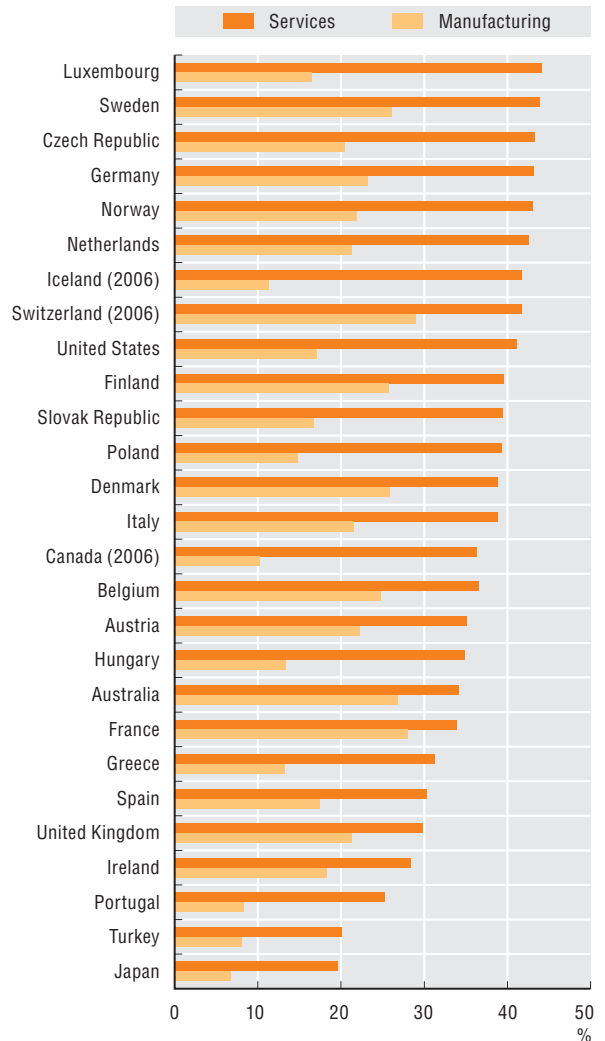
As a percentage of total employment



StatLink <http://dx.doi.org/10.1787/746567077843>

Share of HRST employees by industry, 2007

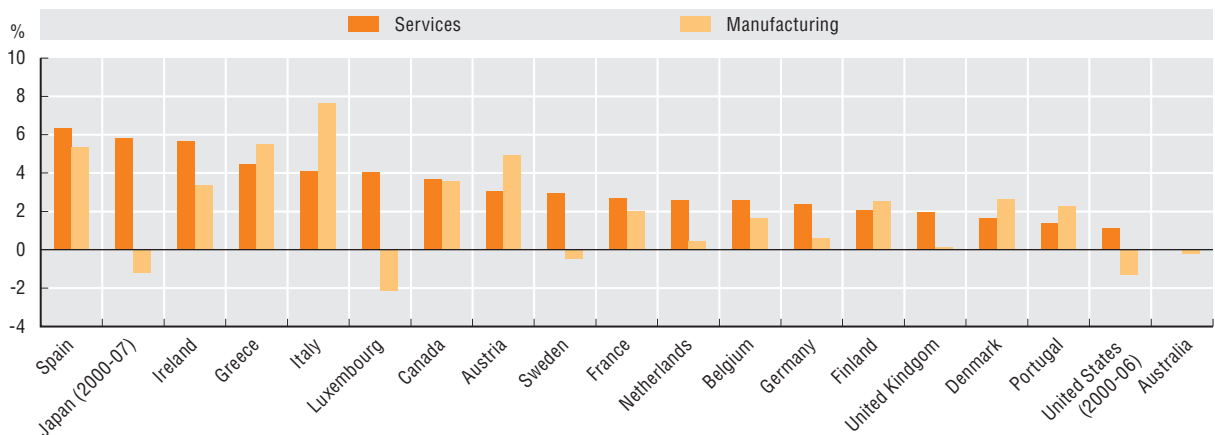
As a percentage of total employees in the industry



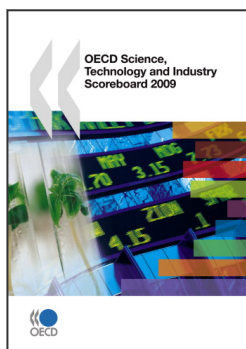
StatLink <http://dx.doi.org/10.1787/746604472507>

Growth of HRST employees by industry, 1997-2007

Average annual growth rate



StatLink <http://dx.doi.org/10.1787/746612226814>



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