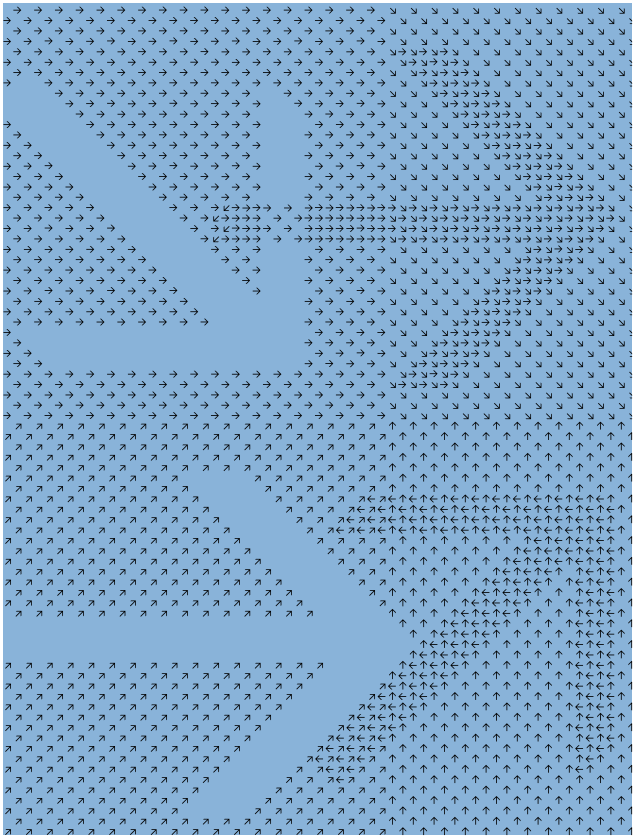
Science and technology (S&T) indicators in Switzerland



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Home Affairs FDHA
Federal Statistical Office FSO

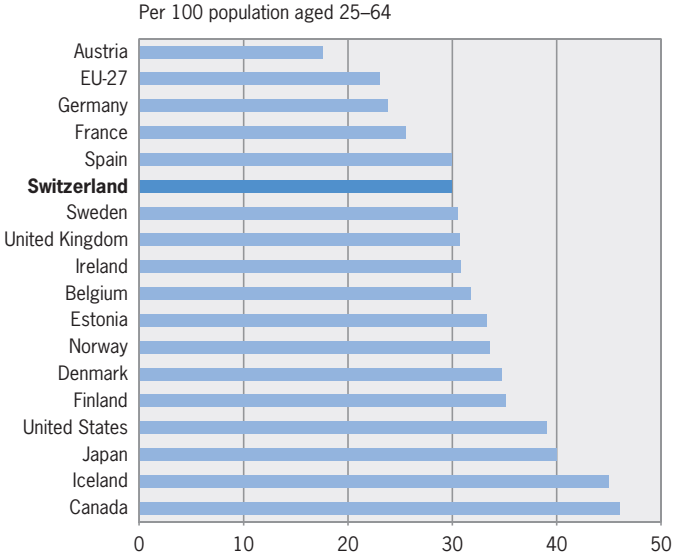
Neuchâtel, 2008

Tertiary education

Members of the population aged between 25 and 64 who have completed tertiary education[1] constitute a reserve of highly qualified human resources essential to the production and dissemination of knowledge in an information-based economy and society.

By international comparison, Switzerland is situated above the average of OCDE countries, with 30% of the population having completed a tertiary degree. Top of the list are Canada and Iceland with respectively 46% and 45%.

International comparison of population with tertiary education[1], 2006*



[1] The tertiary level comprises training in the scope of higher vocational education and of the universities.

* 2006 or nearest available year

Source: European Commission, DG Entreprises, European innovation scoreboard, 2007

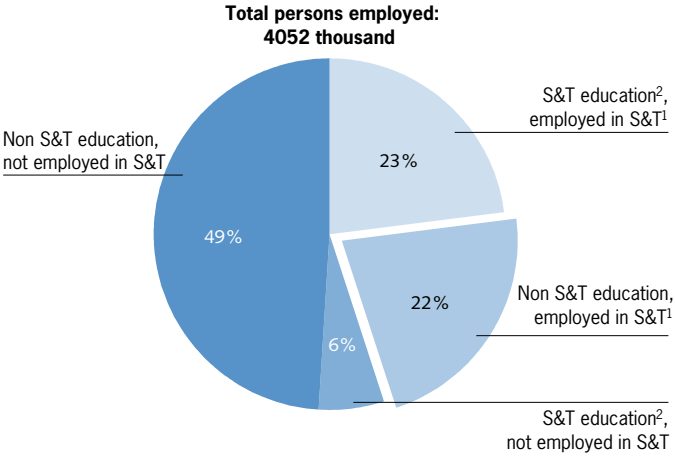
Human resources in Science and Technology

Human resources in Science and Technology (S&T) contribute to the production, dissemination and application of S&T knowledge. They are the key resources essential to economic growth and to the emergence of an information-based economy and society.

In Switzerland, 45% of the active population is occupied in the S&T area, although almost half of these persons have not received tertiary education or training (22%).

S&T Human Resources in Switzerland, 2006

In % of total number of persons employed



[1] The population "employed in S-T" encompasses members of the following professions: directors, senior executives (CITP 122, 123, 131), intellectual and scientific professions (CITP 2), intermediate professions (CITP 3).

[2] The population "S-T educated and trained" encompasses people with the following education and training: tertiary "higher vocational education and training" (CITE 5B) and tertiary level "universities" (CITE 5A et CITE 6).

Source: SFSO's Swiss Labour Force Survey, Neuchâtel, 2006

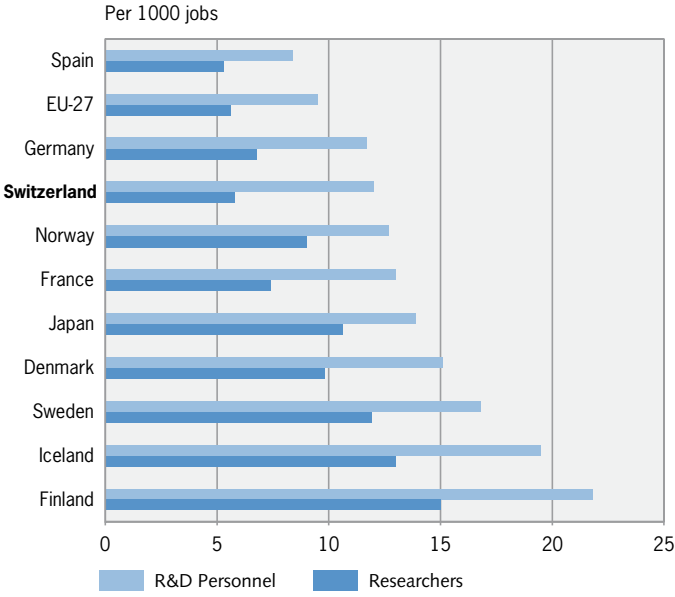
Research and development personnel

An abundant and well-qualified research and development personnel contributes to the development of scientific and technological knowledge necessary to the economy and society.

In Switzerland, the number of persons working in R&D and their level of qualification have risen during the past 10 years. By international comparison, Switzerland is on a level with the majority of European Union (EU) and OECD countries.

In Switzerland, for every 1000 employees, 12 work in R&D and 6 as researchers. As far as these two results are concerned, Switzerland is placed above EU average, but cannot compete with the Scandinavian countries, nor with Japan or France.

International comparison of R&D personnel and researchers, 2005*



* 2005 or nearest available year – Switzerland: 2004

Source: OECD, MSTI database, STI/EAS divisions, Paris, November 2007, SFSO, R&D statistics

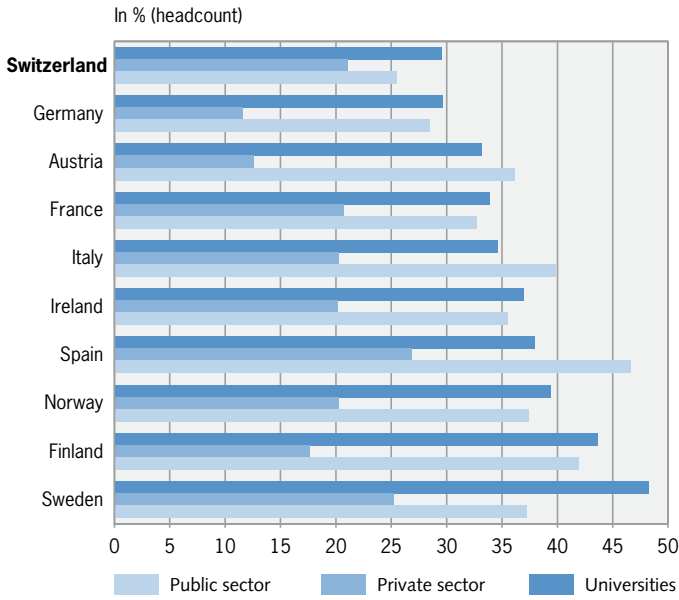
Women in research

The integration of women in research and development (R&D) contributes to scientific progress and economic growth. Despite steps taken in most European countries to promote women in R&D, their numbers remain low.

In 2005, the proportion of women working in research teams failed to reach the threshold of 50% in any european country.

The proportion of women researchers varies considerably depending on the sector. In Switzerland, as in most European countries, the lowest representation is to be found in the private sector.

International comparison of women researchers in various sectors, 2005*



* 2005 or nearest available year – Switzerland: 2004

Source: OECD, MSTI database, STI / EAS divisions, Paris, November 2007, SFSO, R&D statistics, SFSO calculations based on source

European Union Research Framework Programmes

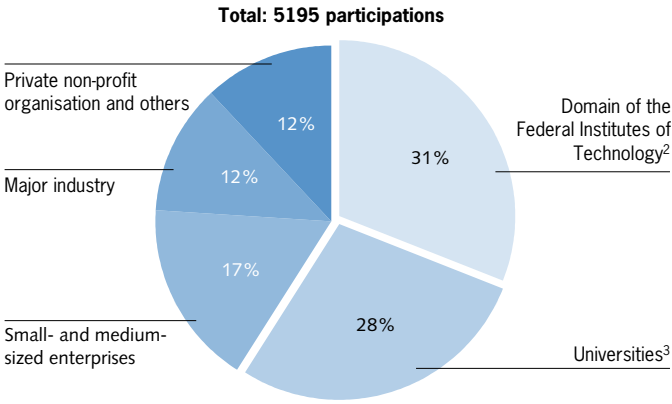
Co-operation between scientists and research institutions is essential to scientific progress. Aware of the importance of such co-operation, Switzerland is involved in an increasing number of international projects, in particular in the European Union Research Framework Programmes (FP).

In 2007, Swiss financial involvement in the FP amounted to 1696 million Francs.

In Switzerland, the institutes of the domain of the Federal Institutes of Technology are most actively involved in FP; 31% of participants come from this domain and 28% from universities (universities and universities of applied sciences).

Swiss participation (1992–2007) in the 3rd, 4th, 5th and 6th FP[1] by institution

In %



[1] FP = EU Framework Programmes for Research and Technological Development. The figures regarding FP6 are provisional.
[2] Domain of the Federal Institutes of Technology : This heading includes the Swiss Federal Institute of Technology in Zurich (ETHZ) and in Lausanne (EPFL) and the four research centres
[3] Universities: This heading includes both universities and universities of applied sciences

Source: "Swiss participation in European Union Framework Programme 1992–2005. Facts and figures", Secretary of State for Education and Research(SER), 2006 (ISSN 1424-3350). For the years after 2005, data was provided by the SER.

Research and development expenditure

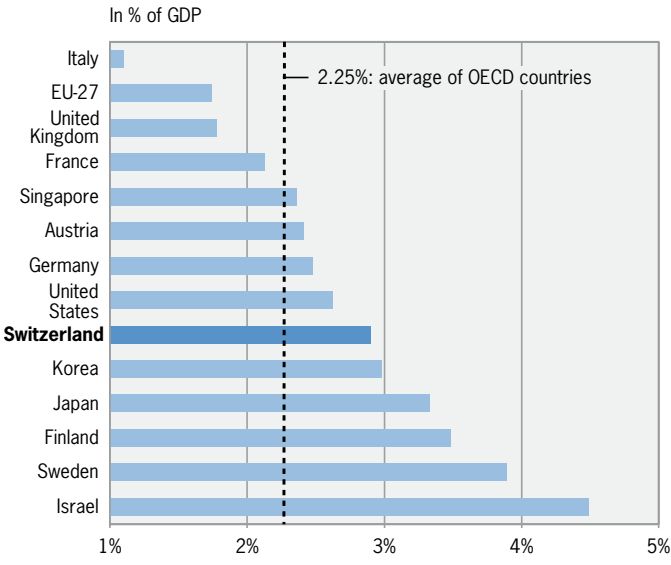
National research and development (R&D) effort is an indication of a country's commitment to its S&T system and of its motivation to orientate itself towards a knowledge-based economy and society.

Although expenditure is low in absolute terms, Switzerland is extremely active in all R&D sectors and compares well with most European Union (EU) and OCDE countries.

Switzerland is among those countries which proportionally spend the most for R&D (2.9% of GDP in 2004).

Also in the vanguard are Israel and Sweden who spend 4.5%, respectively 3.9% of their GDP on R&D.

International comparison of Gross domestic expenditure on R&D, 2005*



* 2005 or nearest available year – Switzerland: 2004

Source: OECD, MSTI database, STI / EAS divisions, Paris, November 2007, SFSO, R&D statistics

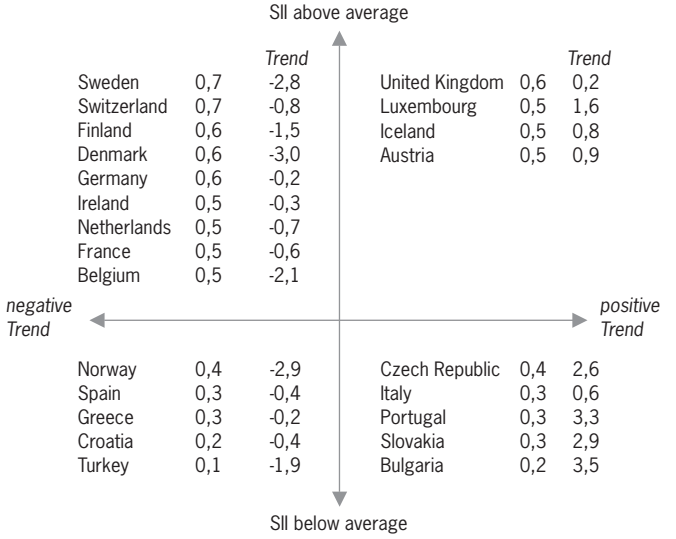
Innovation*

Research and innovation form the basis of the knowledge society and are a driving force in economic growth.

In 2007, according to the Summary Innovation Index (SII), Switzerland was among the most innovative countries in Europe, although the rate of growth on the index is decreasing. Switzerland owes its good position to dynamic Swiss enterprises whose expenditure for research and development (as a percentage of GDP), for innovation (as a percentage of turnover) and the number of patent applications are among the highest in Europe.

* This indicator ranks countries according to two factors: the summary innovation index (SII) and the trend. The countries are classified within four scales which enable their positioning in relation to the European average of these two factors.

Summary Innovation Index[1] and general trend[2] in various countries, 2007



[1] Summary Innovation Index (SII) measures a country's innovation performance. It represents the average weighted by the 25 indicators of the European innovation scoreboard 2007.

[2] The trend measures the development of innovation performance of a country compared to european development. It represents the average rate of growth of the SII (2003–2007) compared to the average european rate of growth.

Source: European Commission, DG Entreprises, European innovation scoreboard, 2007

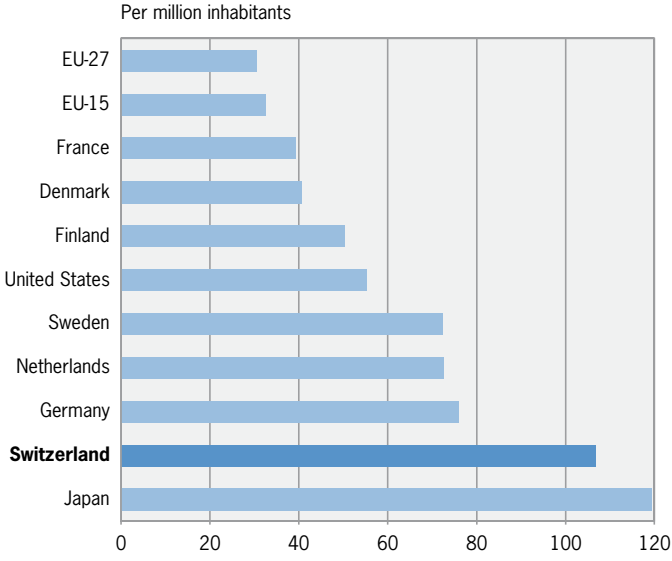
Patent families

Statistics regarding the number of patents serve as a partial indicator of the progress made by research and development (R&D) in terms of inventions.

Due to its small size, Switzerland holds only a small portion (2% in 2005) of the total of all patent families of all OCDE countries.

In 2005, with 107 patents per million inhabitants, Switzerland is, after Japan, the most active OCDE country in this area.

International comparison of triadic patent families[1],2005



[1] A patent family is defined as a set of patents filed in several countries to protect a single invention. The term, "triadic patent families", refers to patents filed at the European Patent Office (EPO), the Japan Patent Office (JPO) and granted by the US Patent and Trademark Office (USPTO).

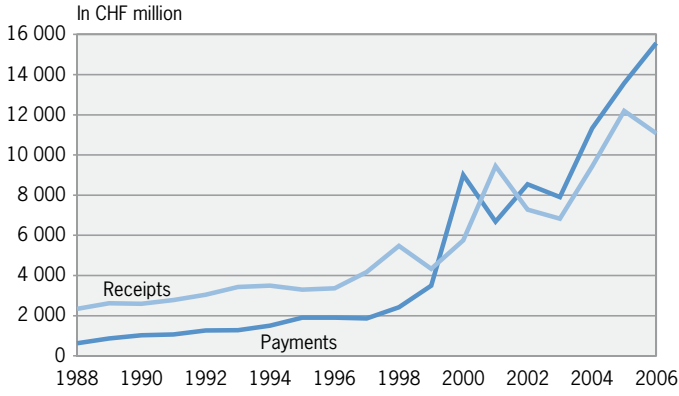
Source: OECD, MSTI database, STI / EAS divisions, Paris, November 2007
SFSO calculations based on source

Technology balance of payments

The technology balance of payments allows us to measure the international transfer of technologies, i.e. the export and import of knowledge and technological services such as technical patents, licences, brand names, knowledge and know-how. It shows the capacity of a country to sell its technology abroad and to use foreign technologies.

In Switzerland, the technology balance of payments fluctuates but remains positive up until 2000. Since 2001 the large growth in payments has resulted in negative results.

Switzerland's Technology Balance of Payments (TBP), 1988–2006



Source: Swiss National Bank (SNB)

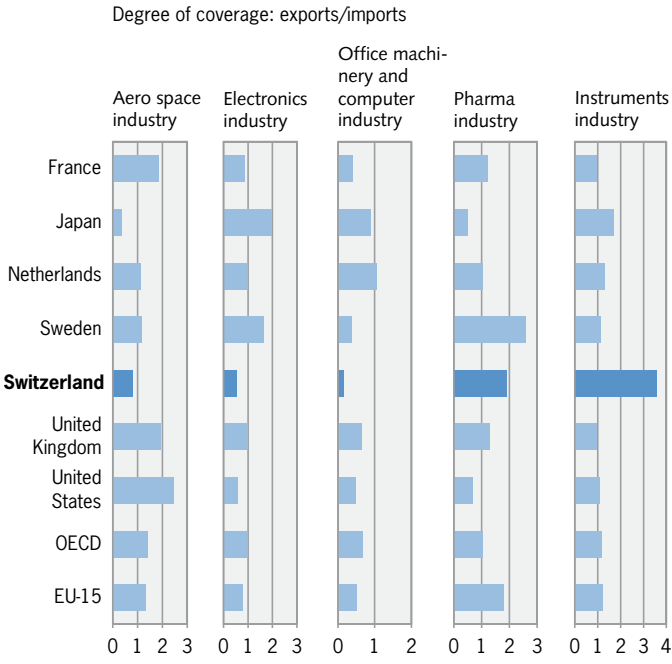
Trade balance in high-tech industries

This indicator measures the international trade of industries most involved in research and development (R&D), those considered as playing a key role in productivity, in the competitive ability of an economic and in laying the foundations for future economic growth. The degree of coverage gives a clear reflection of the areas of specialisation of a given country or region.

The United States has the highest degree of coverage in aerospace industries. Japan excels in the electronics industry and holds a good position in the office machinery and computer industries.

Switzerland is world-leader in the instrument industry and comes second (after Sweden) in the pharmaceutical industry.

Distribution of R&D-intensive industry coverage according to economic sector and country, international comparison, 2005



Source: OECD, MSTI database, STI / EAS divisions, Paris, November 2007
SFSO calculations based on source

What is the function of S&T indicators?

Knowledge-based economies rely increasingly on science and technology as the main source of new knowledge and as a key component in transferring and making use of knowledge.

Science and technology (S&T) indicators are used to quantify the various aspects of the S&T system. They provide detailed information about the structure of the S&T system and its relation to politics, the economy and society. They also allow us to keep track of the S&T system and to place it within an international context.

S&T indicators are regularly updated on the FSO website:

http://www.bfs.admin.ch

Further information:

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