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Introduction

This booklet containing tables and figures on R&D statistics and other science and technology indicators has been published annually since 1997. The booklets are also available on <http://english.nifustep.no/english/content/statistics>. A broader coverage of S&T input and output figures is contained in the publication Report on Science and Technology Indicators for Norway 2003, NIFU STEP, Oslo, April 2004. Below, we describe the R&D statistics and their data sources more in detail. All expenditures are given in current prices, unless otherwise indicated. 1.00 PPP US\$ = 9.48 NOK in 2003 (Main Science and Technology Indicators 2004-2, OECD).

Who prepares the R&D statistics?

R&D statistics in Norway are prepared every second year on commission from the Research Council of Norway. NIFU STEP Studies in Innovation, Research and Education, is responsible for the statistics on the Higher education sector and the Institute sector, while Statistics Norway does the statistics on the Industrial sector. NIFU STEP is also responsible for aggregating total national R&D statistics. Further information may be obtained on the World Wide Web at NIFU STEP's home page: <http://WWW.nifustep.no>, with links to the report mentioned above and the home pages of the Research Council of Norway and Statistics Norway.

How are R&D statistics compiled?

Norwegian R&D statistics are compiled in accordance with the international guidelines issued by the OECD. These guidelines are contained in the "Frascati Manual" (The Measurement of Scientific and Technological activities: Proposed Standard Practice for Surveys on Research and Experimental Development "Frascati Manual 2002", OECD 2002). The sections of this manual dealing with basic definitions and conventions of R&D have been issued in Norwegian by NIFU STEP (2004).

Total R&D figures for Norway are available every year through administrative registers and questionnaires sent to the concerning units in the three performing sectors.

The survey of R&D activity in the **Industrial sector** contains all companies with 50 or more employees. In ad-

dition, the survey includes a number of selected companies with a minimum of 10 employees. Before 1995, the survey included only companies with 50 or more employees. The statistics on the Industrial sector from 1995 are therefore not comparable with those of the previous years.

The **Higher education sector** is thoroughly surveyed. Each individual department or corresponding equivalent unit is surveyed. University hospitals are also included in this sector. Supplementary sources of information include surveys on staff members' time usage, information on personnel and expenditure from the institutions' central administration, the Research Council of Norway, and medical foundations.

The **Institute sector** is also covered by complete surveys. Questionnaires are sent to research institutes and other institutions that are expected to perform R&D activities. In addition, this sector includes estimates of R&D resources at museums and non-university hospitals that are not included in the Higher education sector.

Other data sources:

Government budget appropriations or outlays for R&D (GBAORD) are estimated annually by NIFU STEP. Statistics on **R&D personnel** in the Higher education and Institute sectors are based on NIFU STEP's register on Research personnel, scientists, and engineers. The register is updated every second year. Data on **international R&D statistics** are extracted from the OECD's Main Science and Technology Indicators, and national sources for the Nordic countries. The **doctoral degree statistics** are based on NIFU STEP's Norwegian doctoral degree register, which is updated biannually. Information on **patent applications** is collected by NIFU STEP from Norwegian Patent Office. **Bibliometric data** are extracted from the database National Citation Report for Norway prepared by the Institute for Scientific Information in the U.S. This database contains publication and citation statistics on articles from Norway.

Basic definitions of Research and Experimental Development (R&D)

Research and experimental development comprises work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

Three types of R&D may be distinguished:

- **Basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
- **Applied research** is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.
- **Experimental development** is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

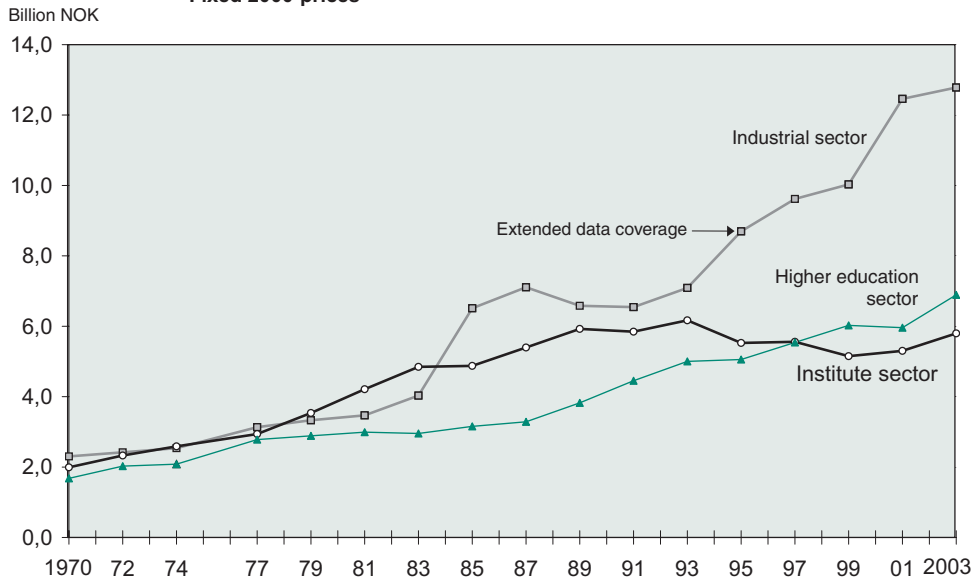
Sector classification

In Norwegian R&D statistics, resources are classified in three performing sectors: The Industrial sector, the Higher education sector, and the Institute sector. The Norwegian classification somewhat differs from the OECD's: For international comparisons Business enterprise sector includes industry as well as non-profit institutes serving firms in Norwegian R&D statistics (these business-oriented institutes are included in the Institute sector in Norway). OECD's Higher education sector corresponds to the Norwegian classification, while its Government sector and Private Non-Profit sector (PNP) together cover the rest of the Institute sector in Norway. The PNP sector is rather small in Norway, and it is therefore included in the Government sector of OECD's statistics.

Highlights

- In 2003 the expenditure on R&D in Norway amounted to 27.3 billion NOK. As a share of the Gross Domestic Product (GDP) the R&D expenditure accounted for 1.75% in 2003 compared to 1.60% in 2001.
- Norwegian R&D expenditure as a share of GDP and R&D expenditure per capita in 2003 were lower than in the other Nordic countries.
- In 2003, 47% of total R&D expenditure in Norway was funded by industry, 42% was funded by government, 4% by other national sources and 7% from abroad.
- Total R&D expenditure in fixed prices had an annual increase by 4% from 2001 to 2003. In the Industry sector the growth rate was 2% per year, while R&D expenditure in the Higher education sector increased by more than 7% per year. The Institute sector had a real annual increase of 5% in the period.
- Total public expenditure in 2003 was 11.4 billion NOK, of which 27% were canalised through the Research Council of Norway to the three performing sectors.
- Basic research as a share of total R&D expenditure was 18% in 2003, compared to 17% in 2001.
- Current R&D expenditure in the Higher education sector amounted to 6.7 billion NOK in 2003, while in the Institute sector the current R&D expenditure amounted to 6.1 billion NOK.
- Engineering and technology was the largest field of science and technology in the Higher education sector and the Institute sector, with current R&D expenditure amounting to 3 billion NOK.
- The share of total R&D personnel over 50 years of age in the Higher education sector in 2003 was 41%, while in the Institute sector it was 28%.
- Government budget appropriations or outlays for R&D were estimated to 14 billion NOK in 2005.
- In 2004 the number of awarded doctorates in Norway was 782, the highest number of awarded doctorates in Norway in one year.
- The number of Norwegian co-authorships with other countries published in international scientific journals in 2003 was for the first time larger than for those without international co-authorship.

Figure 1 R&D expenditure in Norway by sector of performance: 1970-2003.
Fixed 2000-prices



Source: NIFU STEP/Statistics Norway

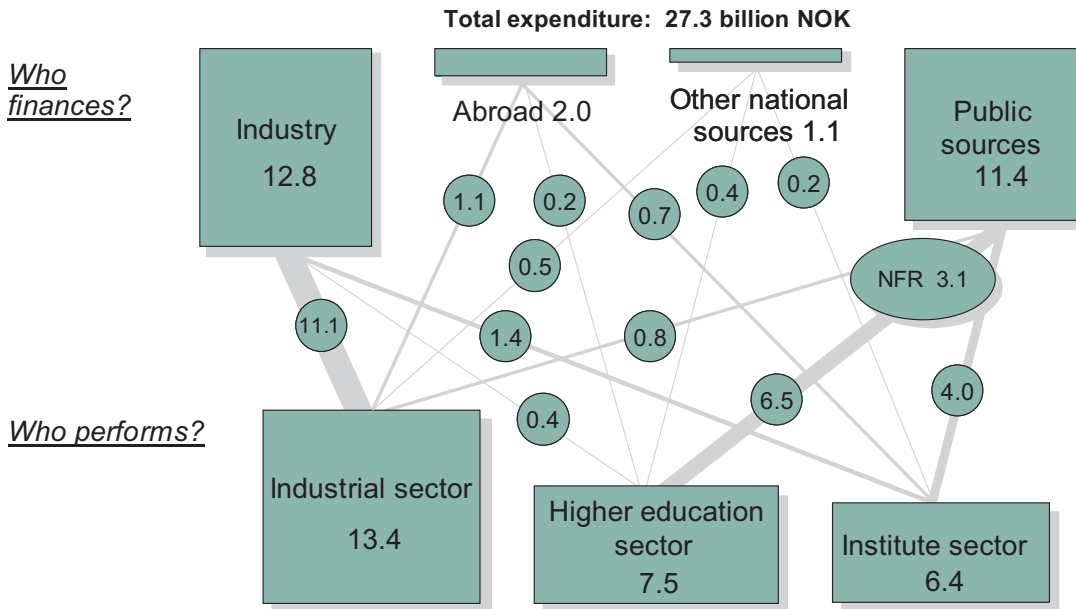
Table 1 Total R&D expenditure in Norway by sector of performance and source of funds: 2003
Million NOK

Sector of performance	Total	Source of funds						
		Industry		Government		Other* national sources	Abroad	
		Total	Of which: Oil com- panies	Total	Of which: The Research Council of Norway		Total	Of which: EU- comm.
Industrial sector	13 477.1	11 062.4	875.1	794.5	155.8	531.5	1 088.7	106.7
Institute sector	6 360.0	1 377.0	301.2	4 035.3	1 568.6	212.2	735.5	217.7
<i>Of which: Research institutes serving enterprises</i>	2 208.2	961.5	234.9	842.7	510.2	100.8	303.2	101.1
<i>Government sector</i>	4 151.8	415.5	66.3	3 192.6	1 058.4	111.4	432.3	116.6
Higher education sector	7 495.1	373.5	101.4	6 531.3	1 370.2	372.1	218.1	137.8
<i>Of which: Universities and Spec. University Inst.</i>	6 599.4	349.6	96.7	5 703.4	1 303.3	336.7	210.2	131.9
<i>State University Colleges</i>	895.7	23.9	4.7	827.9	66.9	36.0	7.9	5.9
Total	27 332.2	12 812.9	1 277.7	11 361.1	3 094.6	1 115.8	2 042.3	462.2

* Includes private funding, own funds and tax deduction (SkatteFUNN) in industrial sector.

Source: NIFU STEP/Statistics Norway

Figure 2 R&D expenditure in Norway by financing and performance: 2003



Sources: NIFU STEP/Statistics Norway

Figure 3 Flow chart of government-financed R&D to performing sectors in Norway: 2003

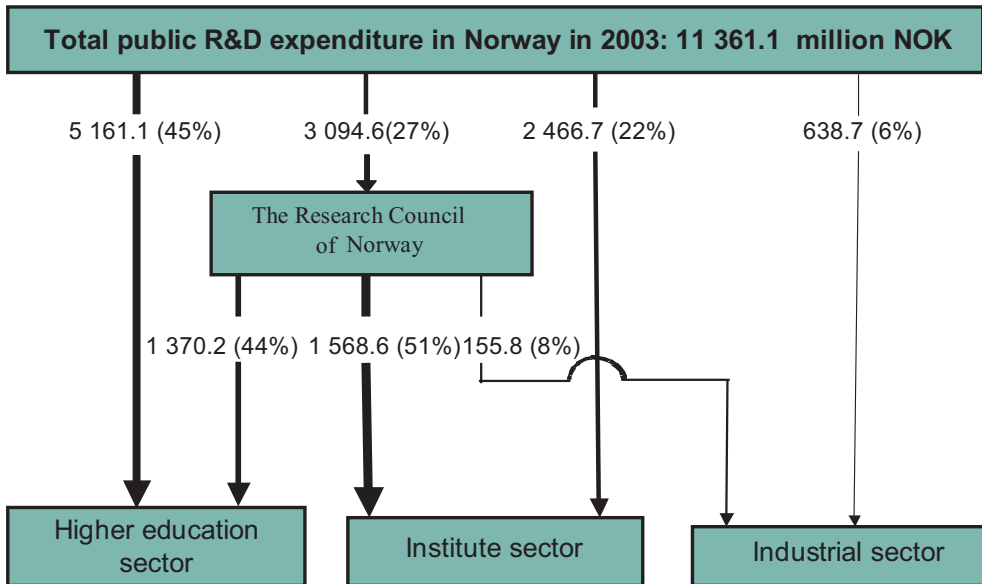
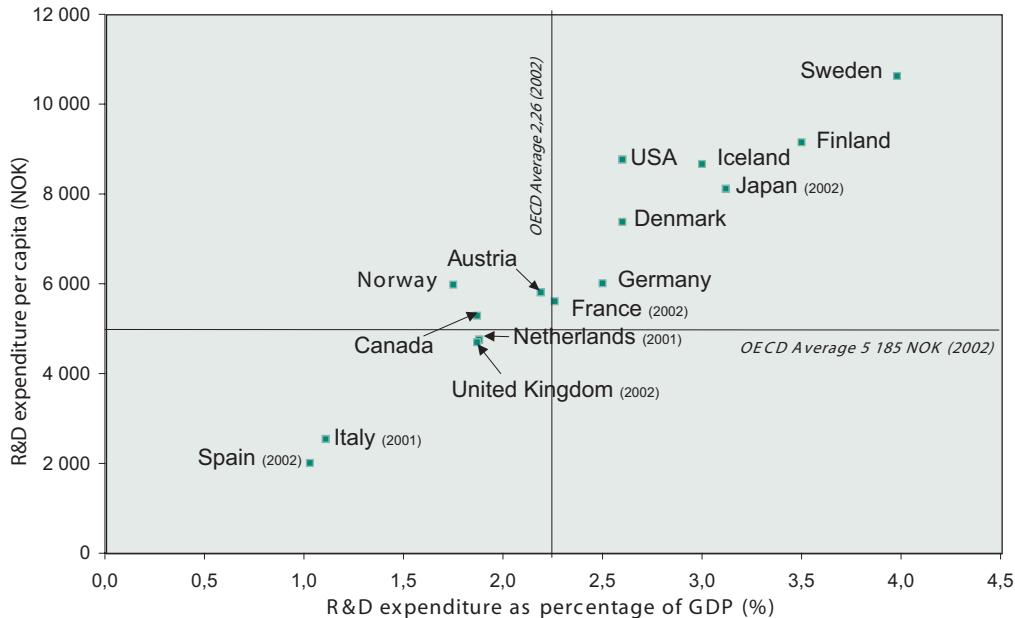


Figure 4 R&D expenditure per capita (NOK) and as percentage of the Gross Domestic Product (GDP) in selected OECD-countries: 2003 or latest available year



Kilde: OECD-Main Science and Technology Indicators 2004-2/ Nordic R&D statistics

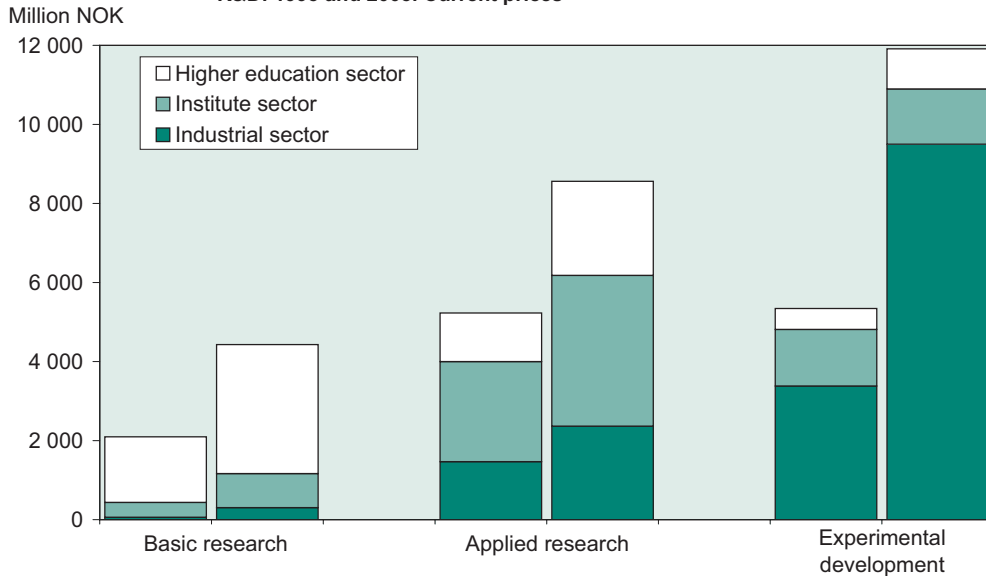
Table 2 R&D expenditure by source of finance and as percentage of GDP and per capita (NOK) for selected OECD-countries: 2001*

Country	R&D expenditure as percentage of BNP				R&D expenditure per capita NOK
	Total	Public funding	Industrial funding	Abroad/ Others	
Austria	2.07	0.79	0.86	0.41	5 312
Canada	2.03	0.62	0.98	0.43	5 438
Denmark	2.40	0.67	1.48	0.25	6 354
Finland	3.41	0.87	2.41	0.13	8 074
France	2.23	0.82	1.21	0.20	5 375
Germany	2.51	0.79	1.65	0.07	5 824
Iceland	3.06	1.04	1.41	0.61	7 464
Japan	3.07	0.57	2.24	0.26	7 655
Netherlands	1.88	0.68	0.97	0.23	4 755
Norway 2001	1.60	0.64	0.82	0.14	5 238
Norway 2003	1.75	0.73	0.82	0.20	5 980
Sweden	4.27	0.90	3.07	0.30	10 381
United Kingdom	1.86	0.53	0.88	0.45	4 472
USA	2.73	0.76	1.84	0.13	8 683
Total OECD	2.28	0.66	1.45	0.17	5 048
EU-15	1.92	0.68	1.08	0.19	4 409

* For Norway: 2003

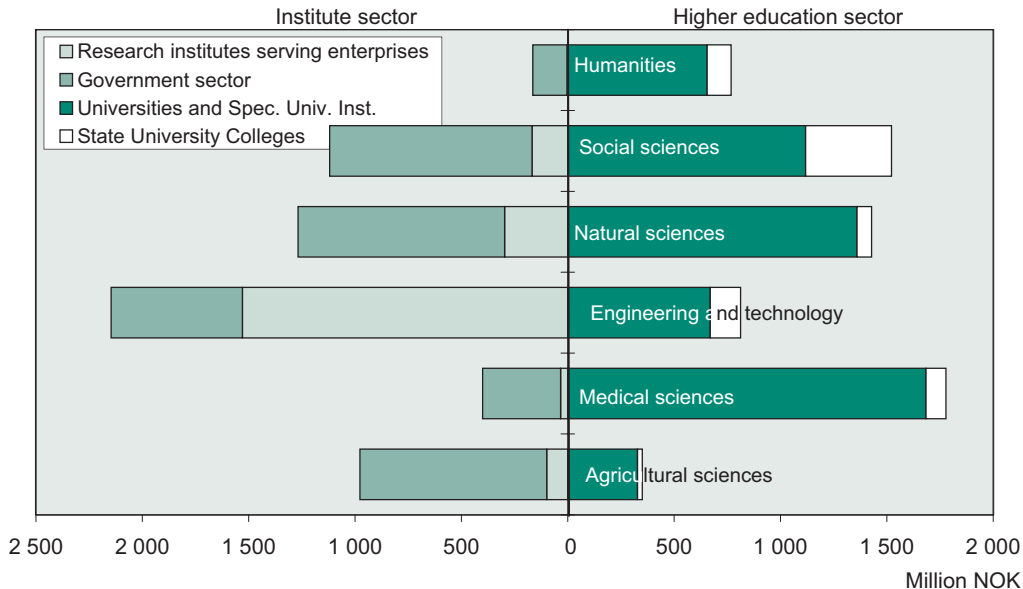
Source: OECD - Main Science and Technology Indicators 2004-2

Figure 5 Current R&D expenditure in Norway by sector of performance and type of R&D: 1993 and 2003. Current prices



Source: NIFU STEP/ Statistics Norway

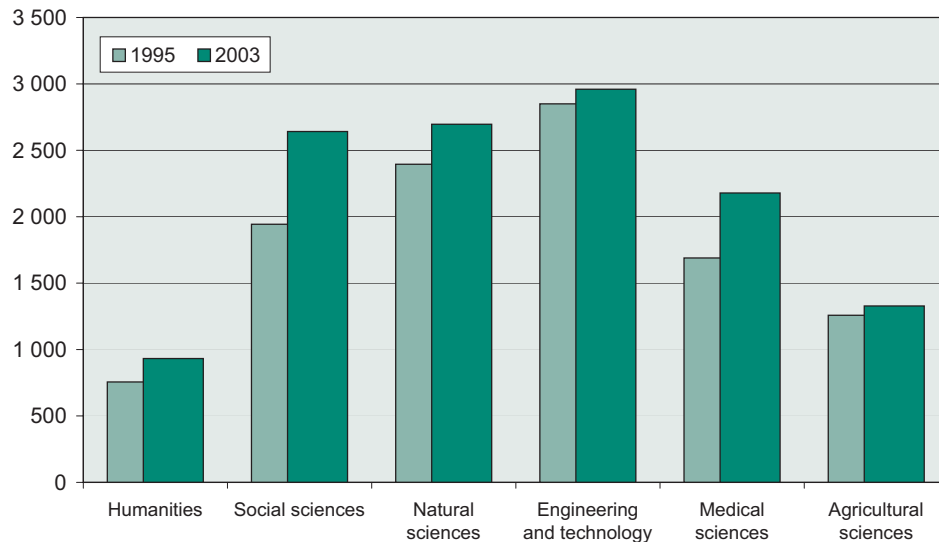
Figure 6 Current R&D expenditure in the Institute sector and the Higher education sector in Norway by field of science and technology: 2003



Source: NIFU STEP

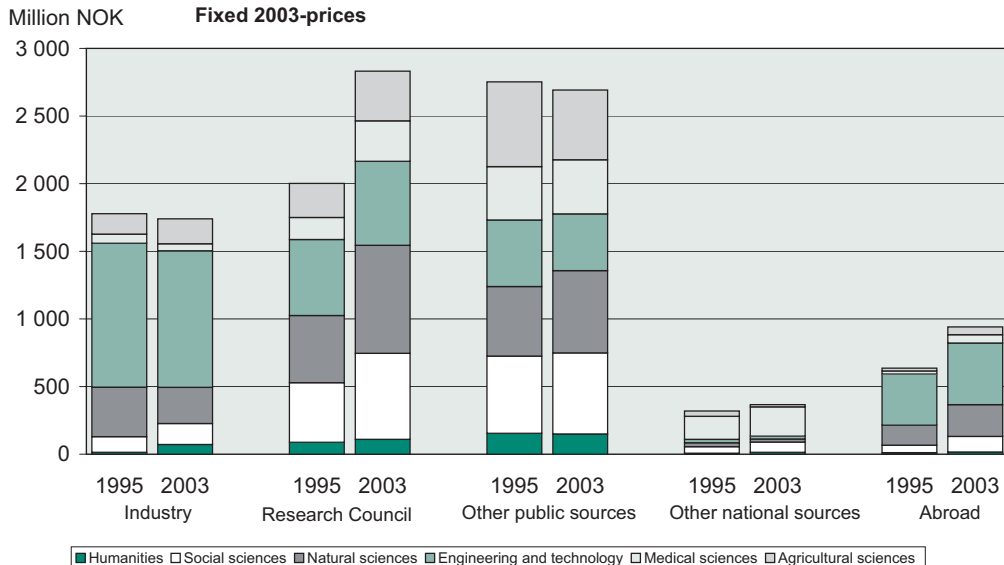
Figure 6.b Current R&D expenditure in the Institute sector and the Higher education sector in Norway by field of science and technology: 1995 and 2003. Fixed 2003-prices

Million NOK



Source: NIFU STEP

Figure 7 Current R&D expenditure in the Institute sector and the Higher education sector in Norway by field of science and technology and source of finance: 1995 and 2003. Fixed 2003-prices



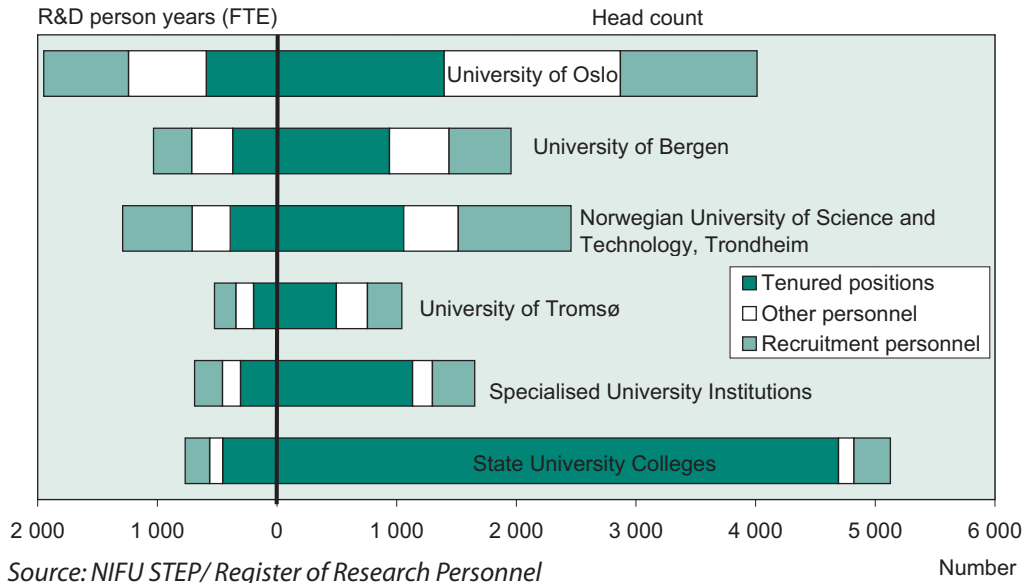
Source: NIFU STEP

Table 3 R&D personnel (head count and FTE) in Norway by sector of performance: 2003

Sector of performance	R&D personnel as of 01.10.2003			R&D person years (FTE)	
	Total	Researchers/ university graduates	Technicians & support staff	Total	Of which: Researchers/ university graduates
Industrial sector	19 856	13 174	6 682	13 901	9 810
Institute sector	9 411	6 350	3 061	7 238	4 962
<i>Of which: Research institutes serving enterprises</i>	2 716	1 980	736	2 225	1 670
<i>Government sector</i>	6 695	4 370	2 325	5 013	3 292
Higher education sector	21 961	16 216	5 745	7 918	6 251
<i>Of which: Universities</i>	13 352	9 436	3 916	6 165	4 795
<i>Specialised University Inst.</i>	2 205	1 653	552	857	689
<i>State University Colleges</i>	6 404	5 127	1 277	896	767
Total	51 228	35 740	15 488	29 057	21 023

Source: NIFU STEP/Statistics Norway

Figure 8 Researchers in the Higher education sector (R&D person years and head count) in Norway by institution: 2003



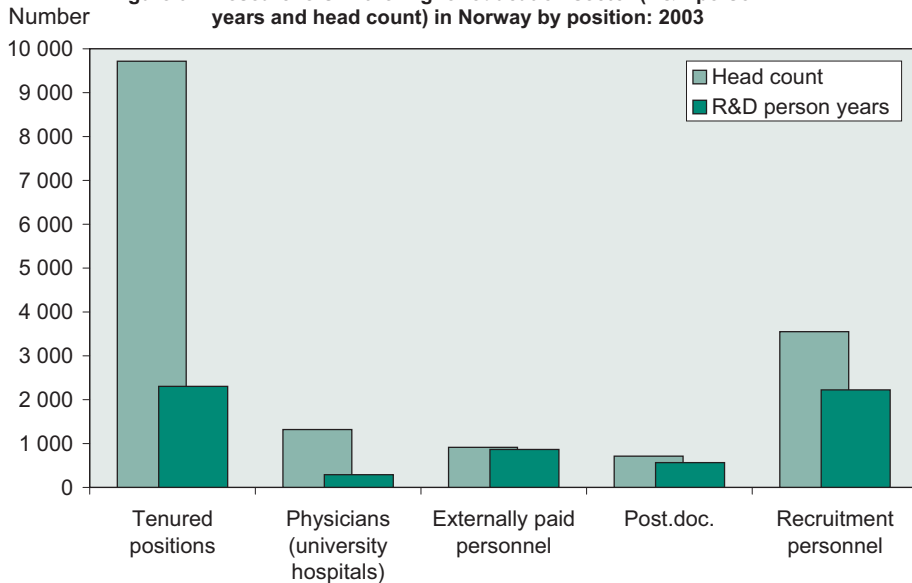
Source: NIFU STEP/ Register of Research Personnel

**Table 4 Researchers/university graduates (head count) in Norway by sector of performance: 2003.
Doctorates and share of women**

Sector of performance	Total			Doctorates			
	Total	Women		Total		Women	
		Number	%	Number	%	Number	%
Industrial sector	13 174	2 381	18.1	1 092	8.3	218	20.0
Institute sector	6 350	2 049	32.3	2 046	32.2	557	27.2
<i>Of which: Research institutes serving enterprises</i>	1 980	485	24.5	640	32.3	127	19.8
<i>Government sector</i>	4 370	1 564	35.8	1 406	32.2	430	30.6
Higher education sector	16 216	6 099	37.6	5 526	34.1	1 489	26.9
<i>Of which: Universities</i>	9 436	3 271	34.7	4 173	44.2	1 145	27.4
<i>Specialised University Inst.</i>	1 653	563	34.1	641	38.8	156	24.3
<i>State University Colleges</i>	5 127	2 265	44.2	712	13.9	185	26.0
Total	35 921	10 613	29.5	8 664	24.2	2 264	26.1

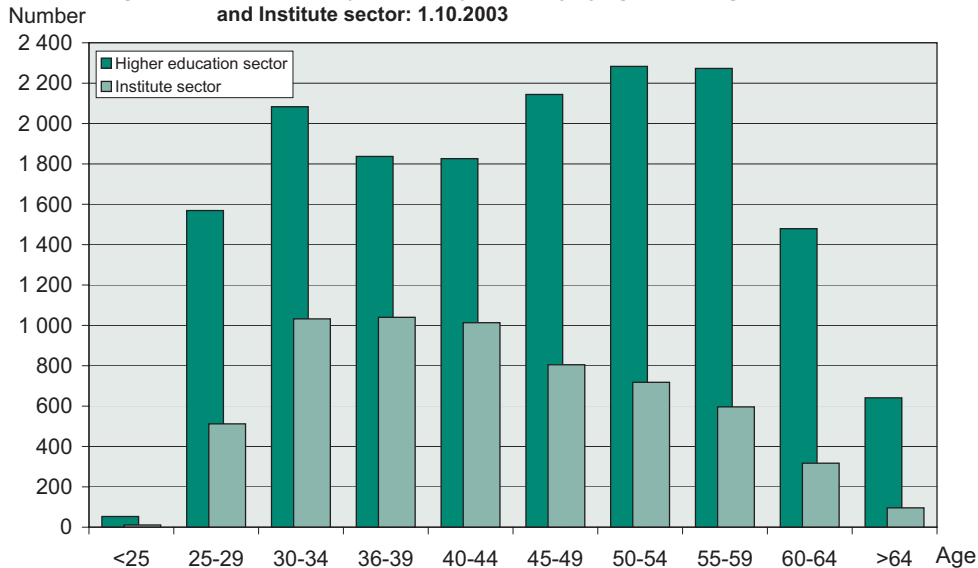
Source: NIFU STEP/Statistics Norway

Figure 9 Researchers in the Higher education sector (R&D person years and head count) in Norway by position: 2003



Source: NIFU STEP/ Register of Research Personnel

Figure 10 Researchers (head count) in Norway by age in the Higher education- and Institute sector: 1.10.2003



Source: NIFU STEP/ Register of Research Personnel

**Table 5 R&D expenditure and R&D person years (FTE) performed in the Industrial sector
in Norway by industry: 2003**

Industry (SN 94)	R&D expenditure		R&D person years (FTE)	
	2001	2003	2001	2003
	Mil. NOK	Mil. NOK	Number	Number
Fishing, operations of fish hatcheries and fish farms (5)	288.9	332.3	210	173
Extraction of crude petroleum and natural gas (11)	736.3	860.0	375	513
Total industry and mining (13-37)	6 660.1	7 152.8	6 415	7 088
<i>Of which: Chemicals and chemical products (23-24)</i>	<i>1 039.0</i>	<i>1 012.9</i>	<i>1 104</i>	<i>1 003</i>
<i> Machinery and equipment (29)</i>	<i>870.6</i>	<i>1 048.3</i>	<i>1 177</i>	<i>1 363</i>
<i> Electrical and optical equipment (30-33)</i>	<i>2 691.3</i>	<i>2 088.6</i>	<i>2 310</i>	<i>2 125</i>
<i> Transport equipment, furniture and other (34-37)</i>	<i>796.6</i>	<i>895.3</i>	<i>592</i>	<i>729</i>
<i> Other industry and mining</i>	<i>1 262.6</i>	<i>2 107.7</i>	<i>1 232</i>	<i>1 868</i>
Electricity, gas and water supply (40-41)	84.4	59.5	76	60
Construction (45)	260.8	250.4	236	275
Total services (50-99)	4 583.2	4 822.1	4 855	5 793
<i>Of which: Transport and telecommunication (60-64.2)</i>	<i>795.7</i>	<i>664.9</i>	<i>856</i>	<i>591</i>
<i> Financial intermediation (65-67)</i>	<i>449.8</i>	<i>431.4</i>	<i>172</i>	<i>598</i>
<i> Computer and related activities (72)</i>	<i>1941.6</i>	<i>2 109.0</i>	<i>2 193</i>	<i>2 751</i>
<i> Other business activities and consultant services (74)</i>	<i>768.5</i>	<i>922.9</i>	<i>924</i>	<i>1 057</i>
<i> Other services</i>	<i>627.6</i>	<i>693.9</i>	<i>710</i>	<i>796</i>
Total	12 613.7	13 477.1	12 167	13 902

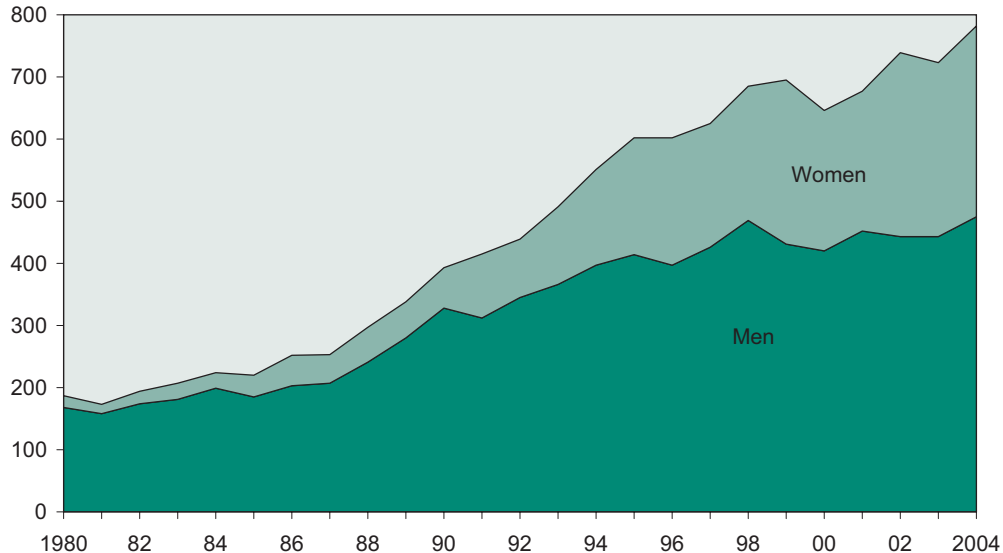
Source: Statistics Norway

Table 6 Government budget appropriations or outlays for R&D (GBAORD) in Norway by Socio-economic objectives. Includes resources for R&D performed in Norway and abroad. Final budget: 2004 and 2005. Million NOK

Socio-economic objectives	2004	2005
Agriculture, forestry and fishery	1 145	1 158
<i>Of which: fishery</i>	655	662
Industrial development	1 008	1 058
Production and distribution of energy	311	401
Transport and telecommunications	245	254
Living conditions and physical planning	18	16
Environment	286	280
Health	987	1 038
Social conditions	190	241
Culture, mass media and leisure	130	136
Education	85	122
Working conditions	78	38
Economic planning and public administration	364	337
Exploration and exploitation of the earth and atmosphere	251	256
General advancement of knowledge	6 945	6 976
Space research	259	303
Defence	865	877
EU contingent	570	525
Total	13 737	14 016

Source: NIFU STEP

Number **Figure 11 Earned doctoral degrees in Norway by gender: 1980-2004**



Source: NIFU STEP/ The Doctoral Degree Register

Figure 12 Norwegian articles with and without international co-authorship: 1981-2003



Source: National Citation Report for Norway, Institute for Scientific Information (ISI)