

NATIONAL SCIENCE FOUNDATION

TOKYO REGIONAL OFFICE

April 21, 2006

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Report Memorandum #06-04

2005 Survey on Research and Development in Japan: Increase in Expenditures for Five Consecutive Years

In December 2005 the Statistics Bureau of Japan's Ministry of Internal Affairs and Communications (MIC) published a report on research and development (R&D) in Japan based on the survey conducted on March 31, 2005. The following is a summary translation of the survey results and was prepared by Ms. Kazuko Shinohara of the National Science Foundation's Tokyo Regional Office. She can be reached at kshinoha@nsf.gov

Organizations the questionnaire was sent to and return ratio

Industry

A questionnaire was sent to about 13,000 companies which have more than Yen 10 million (ca. \$85,470) in capital and are involved in R&D activities, including a small number of independent administrative organizations and special corporations. Return ratio was about 79 percent.

Non-profit organizations

About 1,000 national, public, and non-profit research organizations were also queried. Return ratio was about 99 percent.

Universities

In addition, about 3,000 universities and inter-university research institutions, and technical colleges were also queried. Return ratio was 100 percent.

Date/Period of the statistical data

Number of researchers: As of March 31, 2005

Research expenditures: One year retroactive from the most recent account closing date on or before March 31, 2005

SUMMARY of the Survey Results

1. R&D Expenditures

The total R&D expenditures for JFY2004 in Japan were Yen 16,937.6 billion (ca. \$144.8 billion), a 0.8 percent increase from the previous year, and a consecutive increase in the past five years.

Table-1: R&D Expenditures

	Total R&D Amount (Billion Yen)	Increase/Decrease from Previous Year (%)
2000	16,289.3	1.7
2001	16,528.0	1.5
2002	16,675.1	0.9
2003	16,804.2	0.8
2004	16,937.6	0.8

Of the above amount, the R&D expenditures for natural sciences were Yen 15,599.9 billion (ca. \$133.3 billion), a 0.7 percent increase from the previous year.

Table-2: R&D Expenditures for Natural Sciences

	R&D expenditures for natural sciences (Yen Billion)	Fraction of total R&D expenditures (%)	Increase/Decrease from the previous year (%)
2000	14,988.6	92.0	1.9
2001	15,089.0	91.3	0.7
2002	15,343.6	92.0	1.7
2003	15,492.8	92.2	1.0
2004	15,599.9	92.1	0.7

The ratio of R&D expenditures against GDP was 3.35 percent, the same percentage as in the previous two years. This rate has remained the highest in history for three consecutive years.

Table-3: R&D Expenditures against GDP

	R&D expenditures (A) (Billion Yen)	GDP (B) (Billion Yen)	A/B
2000	16,289.3	513,209.4	3.17
2001	16,528.0	500,920.0	3.30
2002	16,675.1	497,648.8	3.35
2003	16,804.2	501,253.5	3.35
2004	16,937.6	505,427.8	3.35

The breakdown of R&D expenditures by performing organization was: Yen 11,867.3 billion (ca. \$101.4 billion) by companies, 70.1 percent of the total expenditures; Yen 1,796.3 billion (ca. \$15.4 billion) by non-profit research institutions, 10.6 percent; and Yen 3,274.0 billion (ca. \$28.0 billion) by universities, 19.3 percent.

Table-4: R&D Expenditures by Performing Organization

(Unit: Billion Yen)

	Total R&D Amount	Industries	Non-profit Organizations	Universities
2000	16,289.3	10,860.2	2,220.7	3,208.4
2001	16,528.0	11,451.0	1,843.6	3,233.4

2002	16,675.1	11,576.8	1,815.9	3,282.3
2003	16,804.2	11,758.9	1,782.1	3,263.1
2004	16,937.6	11,867.3	1,796.3	3,274.0

The sources of the R&D expenditures were Yen 13, 497.8 billion (ca. \$115.4 billion) from private sector, 79.7 percent of the total expenditure and an increase from the previous year by 1.0 percent, and Yen 3,388.8 billion (ca. \$29.0 billion) from the central and local governments and non-profit organizations, 20.0 percent of the total expenditure and a decrease from the previous year by 0.2 percent.

Table-5: Sources of R&D Expenditures

(Unit: Yen Billion)

	Public Organizations	Private Organizations	Foreign
2000	3,504.8	12,684.2	64.4
2001	3,476.9	12,986.1	64.9
2002	3,452.7	13,162.7	59.7
2003	3,394.3	13,363.3	46.6
2004	3,388.8	13,497.8	51.0

Breakdown of R&D expenditures for natural sciences by basic research, applied research, and developmental research is Yen 2,239.0 billion (ca. \$19.1 billion) (14.4 percent), Yen 3,589.8 billion (ca. \$30.7 billion) (23.0 percent), and Yen 9,771.1 billion (ca. \$83.5 billion) (62.6 percent), respectively. Basic research expenditures decreased by 3.4 percent, applied research expenditures increased by 0.6 percent, and developmental research expenditures increased by 1.7 percent, from the previous year.

Table-6: R&D Expenditures for Natural Sciences by Nature of Research

(Unit: Yen Billion)

	Total R&D expenditures for natural sciences	Basic Research	Applied research	Developmental research
2000	14,988.6	2,205.4	3,585.5	9,197.7
2001	15,089.9	2,203.7	3,525.8	9,359.6
2002	15,343.6	2,298.9	3,503.2	9,541.5
2003	15,492.8	2,316.9	3,567.9	9,607.9
2004	15,599.9	2,239.0	3,589.8	9,771.1

If the **R&D expenditures are viewed by specific purpose**, Yen 2,133.3 billion (ca. 18.2 billion) (12.6 percent) was spent for Life Science, Yen 2,592.6 billion (ca. \$22.2 billion) (15.3 percent) for Information Technology, Yen 825.2 billion (ca. \$7.1 billion) (4.9 percent) for Environment, Yen 496.2 billion (ca. \$4.2 billion) (2.9 percent) for Materials, Yen 140.7 billion (ca. \$1.2 billion) (0.8 percent) for Nanotechnology, Yen 848.7 billion (ca. \$7.3 billion) (5.0 percent) for Energy, Yen 252.2 billion (ca. \$2.2 billion) (1.3 percent) for Space Development, and Yen 85.6 billion (ca. \$0.7 billion) (0.5 percent) for Ocean Development. The expenditures for Space Development field showed the highest increase from the previous year by 47.3 percent, followed by 11.3 percent for Materials field. Energy and Ocean Development fields showed decrease from the previous year by 0.2 percent and 6.0 percent, respectively.

2. R&D Personnel

The number of personnel involved in R&D as of March 31, 2005 was 1,009,900, an increase by 1.6 percent from the previous year. If it is viewed by the type of work, the number of researchers was 790,900 (0.5 percent increase from the previous year), the number of research assistants was 73,100 (8.5 percent increase from the previous year), technicians 67,600 (8.2 percent increase from the previous year), and research administrators or other research-related workers 78,300 (1.4 percent increase from the previous year).

Table-7: R&D Personnel

(Based on work hours: two half-day workers make one)

(Unit: Person)

	Total Number	Researcher	Research Assistant	Technicians	Research Administrators and Other Research-related Personnel
2001	1,000,000	7,50700	79,000	81,200	89,200
2002	972,500	7,56300	68,800	67,100	80,300
2003	968,100	7,57300	67,000	65,100	78,600
2004	994,300	787,300	67,400	62,500	77,200
2005	1,009,900	790,900	73,100	67,600	78,300

If the number of R&D personnel is viewed by gender, 731,800 (88.1 percent) were male and 98,700 (11.9 percent) were female. The ratio of women researchers was the highest in history.

Table-8: R&D Personnel by Gender

(Counted by head)

(Unit: Person)

	Male	Female
2001	668,700	82,000
2002	707,500	85,200
2003	702,600	88,700
2004	734,400	96,100
2005	731,800	98,700

Note: From 2002, the figures in Table-7 use proportional division, whereas the figures in Table-8 are headcounts. This is the reason the figures of Male and Female in Table-8 do not add up 790,900.