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The National Science Foundation's Tokyo Regional Office periodically reports on developments in Japan that are related to the Foundation's mission. It also provides occasional reports on developments in other East Asian countries.

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Report Memorandum #07-02

2006 Survey on Research and Development in Japan: Increase in Expenditures for Six Consecutive Years

In December 2006 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, 2006. 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

Note: The exchange rate used in this report is Yen 114/\$, the average rate during April 2005-March 2006.

Organizations the questionnaire was sent to and return rate

Industry

A questionnaire was sent to about 14,000 companies with more than Yen 10 million

(\$87,719) in capital and which were involved in R&D activities, including a small number of independent administrative organizations and special corporations. Return rate was 78 percent.

Non-profit organizations

About 1,000 national, public, and non-profit research organizations were queried, with a return rate of 99 percent.

Universities

About 3,000 universities, inter-university research institutions, and technical colleges were queried, with a return rate of 100 percent.

Date/Period of the statistical data

Number of researchers: As of March 31, 2006

Research expenditures: One year retroactive from the most recent account closing date on or before March 31, 2006

SUMMARY of the Survey Results

1. Total R&D Expenditures

The total R&D expenditures for JFY2005 (April 1, 2005-March 31, 2006) in Japan were Yen 17,845.2 billion (\$156.5 billion), a 5.4 percent increase from the previous year. Total R&D expenditures in Japan have now increased for six consecutive years, with the 2004 to 2005 increase of 5.4 percent being the largest.

Table-1: Total R&D Expenditures

	Total R&D (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

2005	17,845.2	5.4
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Of the above amount, **the R&D expenditures for natural sciences** were Yen 16,472.1 billion (\$144.5 billion), a 5.6 percent increase from the previous year.

Table-2: R&D Expenditures for Natural Sciences

	R&D for Natural Sciences (Billion Yen)	Fraction of total R&D (%)	Increase/Decrease from 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
2005	16,472.1	92.3	5.6

The ratio of total R&D expenditures against GDP was 3.53, the record highest.

Table-3: Total R&D Expenditures against GDP

	Total R&D (A) (Billion Yen)	GDP (B) (Billion Yen)	A/B
2000	16,289.3	502,783.1	3.24
2001	16,528.0	492,346.7	3.36
2002	16,675.1	488,724.4	3.41
2003	16,804.2	493,622.0	3.40
2004	16,937.6	496,229.1	3.41
2005	17,845.2	505,120.5	3.53

[NSF Tokyo Office Note: The GDP figures in Table-3 are different from those listed in the previous report on this subject (NSF Tokyo Report Memorandum #06-02: <http://www.nsf-tokyo.org/rm06-04.pdf>), as the Statistics Bureau uses “chain” method in calculating the GDP. The Government officially started to use the “chain” method as of 2004, always making the previous year the “base year,” which automatically changes prior year figures. U.S., Canada and U.K. also use this method.]

The breakdown of R&D expenditures by performing organization was: Yen 12,745.8 billion (\$111.8 billion) by companies, 71.4 percent of the total expenditures and a 7.4 percent increase from the previous year; Yen 1,692.0 billion (\$14.8 billion) by non-profits and public research institutions, 9.5 percent of the total expenditures and a 5.8 percent decrease from the previous year; and Yen 3,407.4 billion (\$29.9 billion) by universities, 19.1 percent of the total expenditures and a 4.1 percent increase from the previous year.

Table-4: R&D Expenditures by Performing Organization

(% Total: Percentage of total)

(% I/D: Increase/Decrease from the previous year)

	Total R&D		Industry			Non-profits/Public Organizations			University		
	Bil.Yen	% I/D	Bil.Yen	% Total	% I/D	Bil.Yen	% Total	% I/D	Bil.Yen	% Total	% I/D
2000	16,289.3	1.7	10,860.2	66.7	2.2	2,210.7	13.6	2.3	3,208.4	19.7	-0.0
2001	16,528.0	1.5	11,451.0	69.3	5.4	1,843.6	11.2	-17.0	3,233.4	19.6	0.8
2002	16,675.1	0.9	11,576.8	69.4	1.1	1,815.9	10.9	-1.5	3,282.3	19.7	1.5
2003	16,804.2	0.8	11,758.9	70.0	1.6	1,782.1	10.6	-1.9	3,263.1	19.4	-0.6
2004	16,937.6	0.8	11,867.3	70.1	0.9	1,796.3	10.6	0.8	3,274.0	19.3	0.3
2005	17,845.2	5.4	12,745.8	71.4	7.4	1,692.0	9.5	-5.8	3,407.4	19.1	4.1

The sources of the R&D expenditures were: Yen 14,397.4 billion (\$126.3 billion) from private sector, 80.7 percent of the total expenditure and an increase from the previous year of 6.7 percent; and Yen 3,389.6 billion (\$29.7 billion) from the central and local governments and non-profit organizations, 19.0 percent of the total expenditure and almost unchanged from the previous year.

Table-5: Sources of R&D Expenditures

(% Total: Percentage of total)

(% I/D: Increase/Decrease from the previous year)

	Total R&D		Gov/Local Gov. Organisation			Industry			Foreign		
	Billion Yen	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D

2000	16,289.3	1.7	3,540.8	21.7	1.1	12,684.2	77.9	1.9	64.4	0.4	10.0
2001	16,528.0	1.5	3,476.9	21.0	-1.8	12,986.1	78.6	2.4	64.9	0.4	0.8
2002	16,675.1	0.9	3,452.7	20.7	-0.7	13,162.7	78.9	1.4	59.7	0.4	-0.8
2003	16,804.2	0.8	3,394.3	20.2	-0.7	13,363.3	79.5	1.5	46.6	0.3	-22.0
2004	16,937.6	0.8	3,388.8	20.0	-0.2	13,497.8	79.7	1.0	51.0	0.3	9.6
2005	17,845.2	5.4	3,389.6	19.0	0.0	14,397.4	80.7	6.7	58.2	0.3	14.0

Breakdown of R&D expenditures for natural sciences by basic research, applied research, and developmental research is Yen 2,355.0 billion (\$20.7 billion) (14.3 percent), Yen 3,754.6 billion (\$32.9 billion) (22.8 percent), and Yen 10,362.4 billion (\$90.9 billion) (62.9 percent), respectively. Basic research expenditures increased by 5.2 percent, applied research expenditures increased by 4.6 percent, and developmental research expenditures increased by 6.1 percent, from the previous year.

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

(% Total: Percentage of total)

(% I/D: Increase/Decrease from the previous year)

	Total R&D on Natural Sciences		Basic Research			Applied Research			Developmental Research		
	Billion Yen	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D
2000	14,988.6	1.9	2,205.4	14.7	2.5	3,585.5	23.9	3.5	9,197.7	61.4	1.1
2001	15,089.0	0.7	2,203.7	14.6	-0.1	3,525.8	23.4	-1.7	9,359.6	62.0	1.8
2002	15,343.6	1.7	2,298.9	15.0	4.3	3,503.2	22.8	-0.6	9,541.5	62.2	1.9
2003	15,492.8	1.0	2,316.9	15.0	0.8	3,567.9	23.0	1.8	9,607.9	62.0	0.7
2004	15,599.9	0.7	2,239.0	14.4	-3.4	3,589.8	23.0	0.6	9,771.1	62.6	1.7
2005	16,472.1	5.6	2,355.0	14.3	5.2	3,754.6	22.8	4.6	10,362.4	62.9	6.1

If the **R&D expenditures for natural sciences are viewed by field**, Yen 2,353.0 billion (\$20.6 billion) (13.2 percent) was spent for Life Sciences, Yen 2,801.1 billion (\$24.6 billion) (15.7 percent) for Information Technology, Yen 894.2 billion (\$7.8 billion) (5.0 percent) for Environment, Yen 769.5 billion (\$6.8 billion) (4.3 percent) for Nanotechnology and Materials, Yen 884.5 billion (\$7.8 billion) (5.0 percent) for Energy, Yen 241.5 billion (\$2.1 billion) (1.4 percent) for Space Development, and Yen 96.1 billion (\$0.8 billion) (0.5 percent) for Marine Development. Expenditures for Nanotechnology

and Materials showed the highest increase (20.8 percent) from the previous year, followed by 12.2 percent for Marine Development.

Table-7: R&D Expenditures by Field

(% Total: Percentage of total)

(% I/D: Increase/Decrease from the previous year)

	Life Science			Information Technology			Environment			Nanotechnology & Materials		
	Billion	%	%	Billion	%	%	Billion	%	%	Billion	%	%
	Yen	Total	I/D	Yen	Total	I/D	Yen	Total	I/D	Yen	Total	I/D
2000	1,783.3	10.9	5.3	1,752.6	10.8	0.1	538.3	3.3	11.9	_N/A	N/A	N/A
2001	1,974.3	11.9	10.7	2,252.0	13.6	28.5	678.7	4.1	26.1	350.6	2.1	N/A
2002	2,069.9	12.4	4.8	2,255.1	13.5	0.1	679.9	4.1	0.2	409.9	2.5	16.9
2003	2,077.1	12.4	0.3	2,492.1	14.8	10.5	768.2	4.6	13.0	582.8	3.5	42.2
2004	2,133.3	12.6	2.7	2,592.6	15.3	4.0	825.2	4.9	7.4	636.9	3.8	9.3
2005	2,353.0	13.2	10.3	2,801.1	15.7	8.0	894.2	5.0	8.4	769.5	4.3	20.8

	Energy			Space Development			Marine Development		
	Billion	%	%	Billion Yen	%	%	Billion Yen	%	%
	Yen	Total	I/D	Yen	Total	I/D	Yen	Total	I/D
2000	986.1	6.1	-9.0	296.5	1.8	3.2	113.1	0.7	12.0
2001	762.8	4.6	-22.6	245.2	1.5	-17.3	94.3	0.6	-16.7
2002	800.8	4.8	5.0	268.0	1.6	9.3	96.4	0.6	2.2
2003	850.0	5.1	6.1	153.0	0.9	-42.9	91.1	0.5	-5.4
2004	848.7	5.0	-0.2	225.2	1.3	47.3	85.6	0.5	-6.0
2005	884.5	5.0	4.2	241.5	1.4	7.2	96.1	0.5	12.2

2. R&D Personnel

The number of personnel involved in R&D as of March 31, 2006 was 1,036,200, an increase of 2.6 percent over the previous year. While the numbers of researchers and research administrators and other research-related personnel increased from 2005 to 2006 (3.7 percent and 0.9 percent, respectively), the numbers of research assistants and technicians decreased by 1.9 percent and 3.1 percent, respectively.

Table-7: R&D Personnel

(Unit: 100 Persons, based on “Full-time Equivalents”)

(% Total: Percentage of total)

(% I/D: Increase/decrease from the previous year)

	Total Number		Researchers			Research Assistants		
		% I/D		% Total	% I/D		% Total	% I/D
2001	10,000	-2.2	7,507	75.1	-1.5	790	7.9	-6.6
2002	9,725	-2.8	7,563	77.8	0.7	688	7.1	-12.9
2003	9,681	-0.5	7,573	78.2	0.1	670	6.9	-2.5
2004	9,943	2.7	7,873	79.2	4.0	674	6.8	0.5
2005	10,099	1.6	7,909	78.3	0.5	731	7.2	8.5
2006	10,362	2.6	8,199	79.1	3.7	717	6.9	-1.9

	Technicians			Administrators & Others		
		% Total	% I/D		% Total	% I/D
2001	812	8.1	-3.9	892	8.9	-2.3
2002	671	6.9	-17.3	803	8.3	-10.0
2003	651	6.7	-3.0	786	8.1	-2.1
2004	625	6.3	-4.1	772	7.8	-1.7
2005	676	6.7	8.2	783	7.8	1.4
2006	655	6.3	-3.1	790	7.6	0.9

Viewing the number of R&D personnel by gender, 759,000 (88.1 percent) were male and 102,900 (11.9 percent) were female.

Table-8: Researchers by Gender

(Unit: 100 Persons, based on “Head Counts”)

(% of Total: Percentage of total)

Male	Female
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	Number (100 Persons)	% of Total	Number (100 Persons)	% of Total
2001	6,687	89.1	820	10.9
2002	7,075	89.3	852	10.7
2003	7,026	88.8	887	11.2
2004	7,344	88.4	961	11.6
2005	7,318	88.1	987	11.9
2006	7,590	88.1	1,029	11.9