

# NATIONAL SCIENCE FOUNDATION

## TOKYO REGIONAL OFFICE

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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 #08-02**

#### **2007 Survey on Research and Development in Japan: Increase in Expenditures for Six Consecutive Years**

*In December 2007 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, 2007. The following report was prepared by Ms. Kazuko Shinohara of the National Science Foundation's Tokyo Regional Office. She can be reached at [kshinoha@nsf.gov](mailto:kshinoha@nsf.gov)*

*Note: The exchange rate used in this report is Yen 117/\$, the average rate during April 2006-March 2007.*

#### **Organizations the questionnaire was sent to and their return rate**

##### ***Industry***

A questionnaire was sent to about 14,000 companies with more than Yen 10 million (\$85,470) in capital and conducting 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, 2007

Research expenditures: One year prior to the most recent account closing date on or before March 31, 2007

### **SUMMARY of the Survey Results**

#### **1. Total R&D Expenditures**

**1-1. The total R&D expenditures for JFY2006 (April 1, 2006-March 31, 2007) in Japan** were Yen 18,463.1 billion (\$157.8 billion), a 3.5 percent increase from the previous year. Total R&D expenditures in Japan have now increased for seven consecutive years, with the 2005 to 2006 increase of 3.5 percent being the second largest in the past six years.

**Table-1: Total R&D Expenditures**

<b>JFY</b>	<b>Total R&amp;D (Billion Yen)</b>	<b>Increase/Decrease from Previous Year (%)</b>
<b>2001</b>	16,528.0	1.5
<b>2002</b>	16,675.1	0.9
<b>2003</b>	16,804.2	0.8
<b>2004</b>	16,937.6	0.8
<b>2005</b>	17,845.2	5.4
<b>2006</b>	18,463.1	3.5

1-2. Of the above amount, the R&D expenditures for natural sciences were Yen 17,092.7 billion (\$146.1 billion), a 3.8 percent increase from the previous year.

**Table-2: R&D Expenditures for Natural Sciences**

JFY	R&D for Natural Sciences (Billion Yen)	Fraction of Total R&D	Increase/Decrease from Previous Year (%)
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
2006	17,092.7	92.6	3.8

1-3. The ratio of total R&D expenditures over GDP was 3.62, the record highest.

**Table-3: Total R&D Expenditures and GDP**

JFY	Total R&D (A) (Billion Yen)	GDP (B) (Billion Yen)	A/B
2001	16,528.0	493,644.7	3.35
2002	16,675.1	489,875.2	3.40
2003	16,804.2	493,747.5	3.40
2004	16,937.6	498,276.2	3.40
2005	17,845.2	503,321.3	3.55
2006	18,463.1	510,092.3	3.62

[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 #07-02: <http://www.nsftokyo.org/rm07-02.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.]

**1-4. The breakdown of R&D expenditures by performing organization was:** Companies - Yen 13,327.4 billion (\$113.9 billion), 72.2 percent of the total expenditures and a 4.6 percent increase from the previous year; Non-profits and public Research Institutions - Yen 1,753.3 billion (\$15.0 billion), 9.5 percent of the total expenditures and a 3.6 percent increase from the previous year; and Universities - Yen 3,382.4 billion (\$28.9 billion), 18.3 percent of the total expenditures and a 0.7 percent decrease from the previous year.

**Table-4: R&D Expenditures by Performing Organization**

(% Total: Percentage of total)

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

JFY	Total R&D		Industry			Non-profits/Public Organizations			University		
	Billion Yen	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D
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	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
2006	18,463.1	3.5	13,327.4	72.2	4.6	1,753.3	9.5	3.6	3,382.4	18.3	-0.7

**1-5. The source of R&D expenditures** included: Private Sector - Yen15,066.8 billion (\$128.8 billion), 81.6 percent of the total expenditure and an increase from the previous year of 4.6 percent; and the Central and Local Governments and Non-profit Organizations - Yen 3,335.0 billion (\$28.5 billion), 18.1 percent of the total expenditure and a 1.6 percent decrease from the previous year.

**Table-5: Source of R&D Expenditures**

(% Total: Percentage of total) (% I/D: Increase/Decrease from the previous year)

JFY	Total R&D		Gov./Local Gov. Organization			Industry			Foreign		
	Billion Yen	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D
2001	16,528.0	1.5	3,476.9	21	-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	-0.2	13,497.8	79.7	1	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
2006	18,463.1	3.5	3,335.0	18.1	-1.6	15,066.8	81.6	4.6	61.3	0.3	5.5

**1-6. Breakdown of R&D expenditures for natural sciences by basic research, applied research, and developmental research** is Yen 2,375.6 billion (\$20.3 billion) (13.9 percent), Yen 3,787.7 billion (\$32.4 billion) (22.2 percent), and Yen 10,929.4 billion (\$93.4 billion) (63.9 percent), respectively. Basic research expenditures increased by 0.9 percent, applied research expenditures increased by 0.9 percent, and developmental research expenditures increased by 5.5 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)

JFY	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
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
2006	17,092.7	3.8	2,375.6	13.9	0.9	3,787.7	22.2	0.9	10,929.4	63.9	5.5

**1-7.** If the **R&D expenditures for natural sciences are viewed by field of science:** Yen 2,555.4 billion (\$21.8 billion) (13.8 percent) was spent for Life Sciences; Yen 2,925.3 billion (\$25.0 billion) (15.8 percent) for Information Technology; Yen 980.4 billion (\$8.4 billion) (5.3 percent) for Environment; Yen 823.8 billion (\$7.0 billion) (4.5 percent) for Nanotechnology and Materials; Yen 947.6 billion (\$8.1 billion) (5.1 percent) for Energy; Yen 246.2 billion (\$2.1 billion) (1.3 percent) for Space Development; and Yen 90.5 billion (\$0.8 billion) (0.5 percent) for Marine Development. Expenditures for Environment showed the highest increase (9.6 percent) from the previous year, followed by 8.6 percent for Life Science.

**Table-7: R&D Expenditures by Field**

(% Total: Percentage of total)

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

JFY	LIFE SCIENCE			INFORMATION TECH			ENVIRONMENT			NANOTECHNOLOGY		
	Billion	%	%	Billion	%	% I/D	Billion	%	%	Billion	%	%
	Yen	Total	I/D	Yen	Total		Yen	Total	I/D	Yen	Total	I/D
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
2006	2,555.4	13.8	8.6	2,925.3	15.8	4.4	980.4	5.3	9.6	823.8	4.5	7.1

JFY	ENERGY			SPACE Development			Marine Development		
	Billion	%	% I/D	Billion Yen	% Total	% I/D	Billion Yen	% Total	% I/D
	Yen	Total							
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
2006	947.6	5.1	7.1	246.2	1.3	1.9	90.5	0.5	-5.9

## 2. R&D Personnel

**2-1. The number of personnel involved in R&D** as of March 31, 2007 was 1,052,100, an increase of 1.5 percent over the previous year. The number of research-related personnel, technicians, and research assistants has made a big increase from 2006 to 2007 (5.3 percent, 4.5 percent, and 3.0 percent, respectively), and the number of researchers made an increase of 0.8 percent.

**Table-8: R&D Personnel**

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

(% Total: Percentage of total)

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

JFY	Total Number		Researchers			Research Assistants			Technicians			Administrators & Others		
		% I/D		% Total	% I/D		% Total	% I/D		% Total	% I/D		% Total	% I/D
2002	9,725	-2.8	7,563	77.8	0.7	688	7.1	-12.9	671	6.9	-17.3	803	8.3	-10.0
2003	9,681	-0.5	7,573	78.2	0.1	670	6.9	-2.5	651	6.7	-3.0	786	8.1	-2.1
2004	9,943	2.7	7,873	79.2	4.0	674	6.8	0.5	625	6.3	-4.1	772	7.8	-1.7
2005	10,099	1.6	7,909	78.3	0.5	731	7.2	8.5	676	6.7	8.2	783	7.8	1.4
2006	10,362	2.6	8,199	79.1	3.7	717	6.9	-1.9	655	6.3	-3.1	790	7.6	0.9
2007	10,521	1.5	8,266	78.6	0.8	739	7.0	3.0	684	6.5	4.5	832	7.9	5.3

**2-2.** Viewing **the number of Researchers by gender**, 766,100 (87.6 percent) were male and 108,500 (12.4 percent) were female.

**Table-9: Researchers by Gender**

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

(% of Total: Percentage of total)

JFY	Male		Female	
	Number (100 Persons)	% to Total	Number (100 Persons)	% to Total
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
2007	7,661	87.6	1,085	12.4