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2010 Survey on Research and Development in Japan: Decrease in Expenditures for Two Years

In December 2010 the Statistics Bureau of Japan's Ministry of Internal Affairs and Communications (MIC) published a report on its annual survey of research and development (R&D) in Japan based on a survey conducted on March 31, 2010.

The following is a summary translation and analysis of the survey results prepared by Kazuko Shinohara of the NSF Tokyo Regional Office. She can be reached at nsftokyo@nsf.gov The exchange rate used here was the average rate during the period of April 2009-March 2010, ¥93/\$.

Features of the 2009 Survey Results

The survey results show that Japanese total R&D expenditures for JFY2009 (April 1, 2009-March 31, 2010) were ¥17,246.3 billion (\$ 185.4 billion), a decrease of 8.3 percent from the previous year, the worst year-on-year performance in the past decade. The rate of R&D investment over GDP also decreased to 3.62 percent from 3.80 percent in the previous year. The number of researchers decreased by 0.2 percent from the previous year; in contrast, the number of female researchers increased to a record 13.6 percent of

the total researchers.

Organizations surveyed and participation rates

Industry: the questionnaire was sent to about 13,400 companies that have more than ¥10 million (\$100,000) in capital assets and are conducting R&D activities. The return rate was 83 percent.

Non-profit organizations: About 1,100 national, public, and non-profit research organizations were queried, with a return rate of 100 percent.

Universities: About 3,600 departments of universities, two-year colleges, inter-university research institutions, and technical colleges were queried, with a return rate of 100 percent.

Date/Period of the collected statistical data

Number of researchers: As of March 31, 2010 (last day of Japanese Fiscal Year 2009)

Research expenditures: One year prior to the most recent account closing date on or before March 31, 2010

1.0 Summary of the R&D Survey Results

1-1. Total R&D expenditures for JFY2009 (April 1, 2009-March 31, 2010) in Japan were ¥17,246.3 billion (\$185.4 billion), a decrease of 8.3 percent from the previous year, the worst year-on-year performance in the past decade. The amount is about the same as those between 2004 and 2005.

Table-1: Total R&D Expenditures

JFY	Total R&D (¥Billion)	Δ (%)
2004	16,937.6	0.8
2005	17,845.2	5.4
2006	18,463.1	3.5
2007	18,943.8	2.6
2008	18,800.1	-0.8
2009	17,246.3	-8.3

1-2. Total R&D expenditures as a percentage of GDP was 3.62, a decrease from the previous year.

Table-2: Total R&D Expenditures and GDP

JFY	Total R&D (A) (¥Billion)	GDP (B) (¥Billion)	A/B
2004	16,937.6	498,490.6	3.40
2005	17,845.2	503,186.7	3.55
2006	18,463.1	510,937.6	3.61
2007	18,943.8	515,644.2	3.67
2008	18,800.1	494,182.8	3.80
2009	17,246.3	476,412.3	3.62

1-3. The breakdown of R&D expenditures by performing organization reveals a slight increase in the relative importance of universities and a decrease in the relative importance of companies, though industry continues to be the major player in R&D. While the expenditures at universities increased by 3 percent, those at industries decreased by as much as 12.1 percent.

Table-3: R&D Expenditures by Performing Organization

JFY	Total R&D		Industry			Non-profits/Public Organizations			University		
	¥Billion	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)
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
2007	18,943.8	2.6	13,830.4	73.0	3.8	1,689.7	8.9	-3.6	3,423.7	18.1	1.2
2008	18,800.1	-0.8	13,634.5	72.5	-1.4	1,720.6	9.2	1.8	3,445.0	18.3	0.6
2009	17,246.3	-8.3	11,983.8	69.5	-12.1	1,712.7	9.9	-0.5	3,549.8	20.6	3.0

1-4. The source of R&D expenditures shows that after a sharp decline in private sector investment in R&D, the relative importance of government as a source of R&D funds increased. Foreign R&D expenditures in Japan increased, but remain a miniscule portion of total spending in this area.

Table-4: Source of R&D Expenditures

JFY	Total R&D		Gov./Local Gov. Organization			Industry			Foreign (Direct investment from foreign organizations)		
	¥Billion	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)
2004	16,937.6	0.8	3,389.1	20	-0.2	13,497.5	79.7	1.0	51.0	0.3	9.6
2005	17,845.2	5.4	3,389.7	19.0	0.0	14,397.4	80.7	6.7	58.2	0.3	14.0
2006	18,463.1	3.5	3,335.1	18.1	-1.6	15,066.7	81.6	4.6	61.3	0.3	5.5
2007	18,943.8	2.6	3,306.1	17.5	-0.9	15,577.9	82.2	3.4	59.8	0.3	-2.5
2008	18,800.1	-0.8	3,345.6	17.8	1.2	15,387.9	81.9	-1.2	66.6	0.4	11.4
2009	17,246.3	-8.3	3,495.7	20.3	4.5	13,682.5	79.3	-11.1	68.1	0.4	2.2

1-5. Breakdown of R&D expenditures in the natural sciences* by nature of research continues to present a consistent picture among Basic, Applied and Developmental Research. The decrease of 12 percent in developmental research represents companies' lower investments in R&D relative to the previous year. The negligible decrease for the investment in basic research shows that the R&D investment at universities was minimally affected by the economy.

Table-5: R&D Expenditures for Natural Sciences* by Nature of Research

JFY	Total R&D on Natural Sciences		Basic Research			Applied Research			Developmental Research		
	¥Billion	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)	Billion Yen	% of Total	Δ(%)
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
2007	17,556.2	2.7	2,417.1	13.8	1.7	4,075.1	23.2	7.6	11,064.1	63.0	1.2
2008	17,407.8	-0.8	2,392.7	13.7	-0.1	4,065.2	23.4	-0.2	10,949.9	62.9	-1.0
2009	15,865.5	-8.9	2,387.7	15.0	-0.2	3,837.3	24.2	-5.6	9,640.4	60.8	-12.0

* 'Natural Sciences' include Science, Engineering, Agriculture and Health. Of the total R&D expenditures of ¥17,246.3 Billion (\$185.4 Billion), ¥15,865.5 Billion (\$170.6 Billion), 92 percent, was expended in Natural Science fields.

1-6. The R&D expenditures for natural sciences by field of science shows that the expenditures in Space Development recorded an increase of as much as 10.4 percent from the previous year. Marine Development grew by 2.1 percent, although the size of the expenditures is smaller compared with other fields. On the other hand, the IT field experienced a decrease of 11.5 percent.

Table-6: R&D Expenditures by Field

JFY	LIFE SCIENCE			INFORMATION TECH			ENVIRONMENT			NANOTECHNOLOGY		
	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)
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
2007	2,690.1	14.2	5.3	3,151.3	16.6	7.7	1,077.1	5.7	9.9	926.8	4.9	12.5
2008	2,742.5	14.6	1.9	3,025.4	16.1	-4.0	1,105.5	5.9	2.6	990.7	5.3	6.9
2009	2,705.4	15.7	-1.4	2,676.1	15.5	-11.5	1,040.7	6.0	-5.9	907.3	5.3	-8.4

JFY	ENERGY			SPACE Development			MARINE Development		
	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)	¥Billion	% of Total	Δ(%)
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
2007	1,030.8	5.4	8.8	229.1	1.2	-6.9	95.3	0.5	5.3
2008	1,020.6	5.4	-1.0	222.4	1.2	-2.9	94.5	0.5	-0.8
2009	965.6	5.6	-5.4	245.5	1.4	10.4	96.5	0.6	2.1

2.0 Personnel

2-1. The number of personnel involved in R&D as of March 31, 2010 was 1,063,200, a decrease of 0.2 percent over the previous year. This was a minor decrease compared with the decline in the R&D expenditures.

Table-7: R&D Personnel

(Unit = 100 Persons; 'full-time equivalent' for non-university researchers and 'head count' for university researchers)

JFY	Total Number		Researchers			Research Assistants			Technical Staff			Administrators & Others		
		Δ(%)		% of Total	Δ(%)		% of Total	Δ (%)		% of Total	Δ(%)		% of Total	Δ(%)
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
2008	10,552	0.3	8,273	78.4	0.1	750	7.1	1.5	685	6.5	0.1	844	8.0	1.4
2009	10,650	0.9	8,390	78.8	1.4	755	7.1	0.7	658	6.2	-3.9	847	8.0	0.4
2010	10,632	-0.2	8,403	79.0	0.2	748	7.0	-0.9	627	5.9	-4.8	854	8.0	0.8

2-2. Number of researchers by gender: The ratio for female researchers to the total number of researchers as of March 31, 2010 grew to a record 13.6 percent.

Table-8: Researchers by Gender*

(Unit = 100 Persons; based on 'head count')

JFY	Male		Female	
	Number	% to Total	Number	% to Total
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
2008	7,684	87.0	1,149	13.0
2009	7,746	87.0	1,161	13.0
2010	7,682	86.4	1,211	13.6

* The number of researchers of 8,403 in Table 7 does not equal the total number of male and female researchers in Table 8, because Table 7 is based on head count for university researchers and full-time equivalent for non-university researchers, while Table 8 is based only on head count at any organizations.