

NATIONAL SCIENCE FOUNDATION – TOKYO REGIONAL OFFICE

January 30, 2014

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. Tokyo Office Report Memoranda are intended to provide information for the use of NSF program officers and policy makers; they are not statements of NSF policy.

Report Memorandum #14-01

2013 Survey on Research and Development in Japan: Slight Decrease from the Previous Year

In December 2013 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, conducted in mid-May, 2013.

JFY2012 Survey Results: The survey results showed that Japanese total R&D expenditures (Table 1) for JFY2012 (April 1, 2011-March 31, 2012) were ¥17,324.6 billion (\$173 billion), a decrease of 0.3% from the previous year, despite the previous year showed an increase from the year before. The rate of R&D investment as a percentage of GDP was 3.67%, the same as in the previous year. Also of note, the rate of female researchers increased to a record 14.4% of the total, despite the fact that the number of researchers as of March 2013 decreased 1% from March 2012 (Tables 6 and 7).

Table 1: Total R&D Expenditures

| JFY | Total R&D (¥Billion) | Δ (%) | % GDP |
|------|----------------------|-------|-------|
| 2007 | 18,943.8 | 2.6 | 3.69 |
| 2008 | 18,800.1 | -0.8 | 3.84 |
| 2009 | 17,246.3 | -8.3 | 3.64 |
| 2010 | 17,110.0 | -0.8 | 3.56 |
| 2011 | 17,379.1 | 1.6 | 3.67 |
| 2012 | 17,324.6 | -0.3 | 3.67 |

* - The summary translation and analysis of the survey results was prepared by Kazuko Shinohara of the NSF Tokyo Regional Office. Questions can be sent to her at kshinoha@nsf.gov

Analysis of the sources of R&D expenditures showed a decline in private sector investment and an increase in the government source of R&D funds (Table 2). Foreign R&D expenditures in Japan decreased, but remained a miniscule portion of total spending.

Table-2: 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(%) |
| 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 |
| 2010 | 17,100.0 | -0.8 | 3,307.2 | 19.3 | -5.4 | 13,732.0 | 80.3 | 0.4 | 70.8 | 0.4 | 3.9 |
| 2011 | 17,379.1 | 1.6 | 3,232.6 | 18.6 | -2.3 | 14,069.6 | 81.0 | 2.5 | 76.9 | 0.4 | 8.7 |
| 2012 | 17,324.6 | -0.3 | 3,307.5 | 19.1 | 2.3 | 13,945.7 | 80.5 | -0.9 | 71.4 | 0.4 | -7.2 |

The breakdown of R&D expenditures by performing organization revealed a decrease of 0.8% in investment by industry, despite the previous two years' efforts for helping correct sharp reductions in 2009 due to the global economic downturn (Table 3). The growth of university R&D expenditures remained positive (0.6%) as in JFY2011 reversing the decline in JFY2010.

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(%) |
| 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 |
| 2010 | 17,110.0 | -0.8 | 12,010.0 | 70.2 | 0.2 | 1,665.9 | 9.7 | -2.7 | 3,434.0 | 20.1 | -3.3 |
| 2011 | 17,379.1 | 1.6 | 12,271.8 | 70.6 | 2.2 | 1,566.8 | 9.0 | -6.0 | 3,540.5 | 20.4 | 3.1 |
| 2012 | 17,324.6 | -0.3 | 12,170.5 | 70.2 | -0.8 | 1,591.7 | 9.2 | 1.6 | 3,562.4 | 20.6 | 0.6 |

The breakdown of R&D expenditures in the natural sciences continued to present a consistent picture among Basic, Applied and Developmental Research (Table 4). The slight decrease of 0.4% in developmental research represented the decrease of industrial investments in R&D. The increase of 1.5% in basic research indicated

continued recovery of R&D investment in university research.

Table-4: 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(%) |
| 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 |
| 2010 | 15,742.3 | -0.8 | 2,310.4 | 14.7 | -3.2 | 3,638.1 | 23.1 | -5.2 | 9,793.7 | 62.2 | 1.6 |
| 2011 | 16,009.8 | 1.7 | 2,375.9 | 14.8 | 2.8 | 3,658.7 | 22.9 | 0.6 | 9,975.3 | 62.3 | 1.9 |
| 2012 | 15,947.7 | -0.4 | 2,410.7 | 15.1 | 1.5 | 3,605.6 | 22.6 | -1.4 | 9,931.4 | 62.3 | -0.4 |

** - 'Natural Sciences' include Science, Engineering, Agriculture and Health. Of the total R&D expenditures of ¥17,324.6 Billion (\$173 Billion), ¥15,947.7 Billion (\$159 Billion), 92 percent, was expended in Natural Science fields.

Research and Development expenditures by field (Table 5) showed that life science and information technology continued to represent the largest percentages of expenditures. The remarkable increase of 26.7% in Space Development represented investments in building a national flagship launch system and establishing observation satellites associated with national security.

Table-5: 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(%) |
| 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 |
| 2010 | 2,744.0 | 16.0 | 1.4 | 2,422.0 | 14.2 | -9.5 | 1,037.9 | 6.1 | -0.3 | 939.3 | 5.5 | 3.5 |
| 2011 | 2,772.5 | 16.0 | 1.0 | 2,555.7 | 14.7 | 5.5 | 1,040.9 | 6.0 | 0.3 | 882.9 | 5.1 | -6.0 |
| 2012 | 2,873.2 | 16.6 | 3.6 | 2,450.2 | 14.1 | -4.1 | 1,003.9 | 5.8 | -3.6 | 918.5 | 5.3 | 4.0 |

| JFY | ENERGY | | | SPACE Development | | | MARINE Development | | |
|------|----------|------------|------|-------------------|------------|-------|--------------------|------------|------|
| | ¥Billion | % of Total | Δ(%) | ¥Billion | % of Total | Δ(%) | ¥Billion | % of Total | Δ(%) |
| 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 |
| 2010 | 956.3 | 5.6 | -0.1 | 250.3 | 1.5 | 2.0 | 91.4 | 0.5 | -5.3 |
| 2011 | 1,004.6 | 5.8 | 5.1 | 215.6 | 1.2 | -13.9 | 108.5 | 0.6 | 18.7 |
| 2012 | 982.5 | 5.7 | -2.2 | 273.0 | 26.7 | 1.6 | 115.4 | 0.7 | 6.3 |

The number of personnel involved in R&D as of March 31, 2013 was 1,040,500, a decrease of 1.6% over the previous year (Table 6).

Table 6: R&D Personnel

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

| March 31 of | Total Number | | Researchers*** | | | Research Assistants | | | Technical Staff | | | Administrators & Others | | |
|-------------|--------------|------|----------------|------------|------|---------------------|------------|-------|-----------------|------------|------|-------------------------|------------|------|
| | | Δ(%) | | % of Total | Δ(%) | | % of Total | Δ (%) | | % of Total | Δ(%) | | % of Total | Δ(%) |
| 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 |
| 2011 | 10,648 | 0.1 | 8,429 | 79.2 | 0.3 | 749 | 7.0 | 0.1 | 601 | 5.6 | -4.0 | 869 | 8.2 | 1.7 |
| 2012 | 10,576 | -0.7 | 8,444 | 79.8 | 0.2 | 718 | 6.8 | -4.0 | 567 | 5.4 | -5.6 | 846 | 8.0 | -2.7 |
| 2013 | 10,405 | -1.6 | 8,357 | 80.3 | -1.0 | 658 | 6.3 | -8.4 | 535 | 5.1 | -5.8 | 855 | 8.2 | 1.1 |

Number of researchers by gender: The ratio for female researchers to the total number of researchers as of March 31, 2013 grew to a record 14.4 percent (Table 7).

Table-7: Researchers by Gender***

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

| March 31 of | Male | | Female | |
|-------------|--------|------------|--------|------------|
| | Number | % to Total | Number | % to Total |
| 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 |
| 2011 | 7,710 | 86.2 | 1,232 | 13.8 |
| 2012 | 7,680 | 86.0 | 1,247 | 14.0 |
| 2013 | 7,592 | 85.6 | 1,278 | 14.4 |

*** - The number of researchers of 835,700 in Table 6 does not equal the total number of male and female researchers in Table 7, because Table 6 is based on head count for university researchers and full-time equivalent for non-university researchers, while Table 7 is based only on head count at any organizations.

Notes

1. **Organizations surveyed and participation rates**

Industry: the questionnaire was sent to about 13,300 companies that have more than ¥10 million (\$100,000) in capital assets and are conducting R&D activities. The return rate was 84 percent.

Non-profit organizations: About 1,100 national, public, and non-profit research organizations were queried, with a return rate of 99 percent.

Universities: About 3,700 departments of universities, two-year colleges, inter-university research institutions, and technical colleges were queried, with a return rate of 100 percent.

2. **Date/Period of the collected statistical data**

Number of researchers: As of March 31, 2013 (last day of Japanese Fiscal Year 2012)

Research expenditures: One year prior to the most recent account closing date on or before March 31, 2013

3. **The exchange rate** used here was ¥100/\$.