

## Translation



*China's cadre of research and development (R&D) personnel is the largest in the world and is growing rapidly, according to this statistical report by the PRC Ministry of Science and Technology. However, the report also notes that on a per capita basis, China's percentage of R&D workers still lags significantly behind the West.*

### Title

Analysis of the State of Chinese R&D Personnel Development in 2018  
2018年我国R&D人员发展状况分析

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PRC Ministry of Science and Technology (MOST; 科技部)

### Source

MOST website, April 2, 2020

*The Chinese source text is available online at:*

<https://web.archive.org/web/20201030201449/http://www.most.gov.cn/kjbgz/202004/P020200402344067960195.pdf>

*US \$1 ≈ 7 Chinese Yuan Renminbi (RMB), as of November 13, 2020.*

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## 2018 Analysis of China R&D Personnel Development

In 2018, the total number of R&D personnel in China continued to grow, reaching 4.381 million person-years. For every 10,000 employed persons, R&D personnel accounted for 56.5 person-years per 10,000 persons. The total number of R&D researchers reached 1.866 million person-years. For every 10,000 employed persons, the number of R&D researchers was 24.1 person-years per 10,000 persons. The scale of R&D manpower still ranks first in the world, and the intensity of R&D manpower input is still lower than that of Western developed countries, though the gap has narrowed.

### I. The total number of R&D personnel in China has grown steadily

In 2018, the number of R&D personnel in China continued to grow, the proportion of highly educated personnel increased, and the quality (素质) of R&D personnel further improved. The total number of people participating in R&D activities in China was 6.571 million, an increase of 5.8% over the previous year, of which 68.0% were full-time personnel. Among R&D personnel, there were 1.760 million women, an increase of 6.0% over the previous year; and 452,000 with doctoral degrees, 976,000 with master's degrees, and 2.756 million with undergraduate degrees. The number of people with master's degrees accounted for 21.7% of the total, basically the same as the previous year (21.5%).

According to full-time equivalent statistics (全时当量统计), the total number of R&D personnel in China in 2018 was 4.381 million person-years, an increase of 348,000 person-years over the previous year, for an increase of 8.6%, an increase of 4.6 percentage points over the previous year.

The total number of R&D researchers continued to grow, reaching 1.866 million person-years in 2018, an increase of 126,000 person-years over the previous year, for a growth rate of 7.2%. R&D researchers accounted for 42.6% of R&D personnel, an increase of 0.5 percentage points over the previous year.

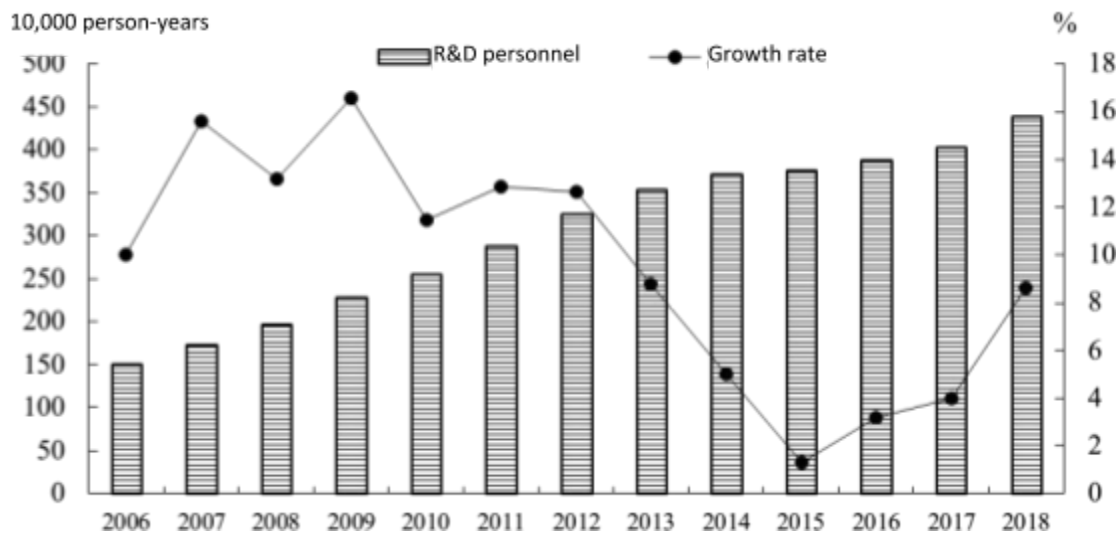


Fig. 1 Trend in total number of R&D personnel in China (2006-2018)

## II. Proportion of corporate R&D personnel has increased, and the proportion of product development (试验发展) personnel remains the same as last year

In 2018, the total number of R&D personnel in Chinese enterprises reached 3.425 million person-years, accounting for 78.2% of the country's total, an increase of 0.5 percentage points over the previous year. The R&D personnel of research institutes and institutions of higher education reached 413,000 and 411,000 person-years, respectively. The combined proportion of the two was 18.8%, a decrease of 0.7 percentage points from the previous year. R&D personnel in other institutions reached 133,000 person-years, accounting for 3.0% of the national total.

In 2018, among China's R&D personnel, scientific researchers accounted for 43.1% of all R&D personnel, an increase of 0.5 percentage points over last year. The proportion of product development personnel is basically the same as the previous year. The number of basic researchers is 305,000 person-years, accounting for 7.0%, a decrease of 0.2 percentage points from the previous year. The number of applied researchers is 539,000 person-years, accounting for 12.3%, an increase of 0.2 percentage points over the previous year. The number of product development personnel is 3.538 million person-years, accounting for 80.7%, which is the same as the previous year.

From the perspective of the distribution of R&D personnel in executive departments by activity type, research institutions, institutions of higher education, and enterprises each have their own characteristics in terms of manpower investment in the three different types of R&D activities. Institutions of higher education emphasize scientific research. Since 2005, the number and proportion of manpower devoted by institutions of higher education to scientific research activities has been increasing steadily. In 2018, institutions of higher education invested 94.5% of manpower in scientific research activities. Enterprises attach great importance to product development activities and invest the most in manpower. In 2018, the proportion reached 96.0%, a slight decrease from the previous year. The manpower investment of research institutions in scientific research has been relatively stable over the years, reaching 56.3% in 2018.

Research institutions, institutions of higher education, and enterprises play different roles. The people engaged in scientific research activities in China are mainly concentrated in institutions of higher education and research institutions. In 2018, science researchers at institutions of higher education accounted for the highest proportion in the country, with basic researchers accounting for 62.7% and applied researchers accounting for 36.5%. This proportion is followed by that of research institutions, with basic researchers accounting for 27.9% and applied researchers accounting for 27.4%. Corporate basic research personnel accounted for less, accounting for only 3.0% of the national total. R&D personnel engaged in product development activities in China are mainly concentrated in enterprises. In 2018, enterprise product development personnel accounted for 92.9% of the national total.

Table 1 Distribution of China R&D personnel by activity type and executive department (2018)

Unit: 10,000 year-persons

Year	Nationwide	Enterprises	Research institution	Higher education institutions	Other
Total	438.1	342.5	41.3	41.1	13.3
Basic research	30.5	0.9	8.5	19.1	1.9
Applied research	53.9	12.9	14.7	19.7	6.5
Product development	353.8	328.7	18.0	2.3	4.8

### III. Gap between China's R&D manpower input intensity and developed countries continues to narrow

From the perspective of personnel input, China's full-time equivalent of R&D personnel and R&D researchers has steadily ranked first in the world. In 2017, the full-time equivalent of R&D researchers in the United States was 1.434 million person-years, the largest among developed countries in the world. In addition to China and the United States, Japan, Russia, Germany, and South Korea are the countries that have invested heavily in R&D manpower. The R&D personnel and R&D researchers of each of these four countries account for more than 500,000 and 400,000 person-years, respectively.

Table 2 Countries where the total number of R&D personnel exceeds 100,000 person-years (2018)

Country	R&D personnel (10,000 person-years)	Number of R&D personnel per 10,000 employees (person-years/10,000 persons)	R&D researchers (10,000 person-years)	Number of R&D researchers per 10,000 employees (person-years/10,000 persons)
China	438.1	56.5	186.6	24.1
Japan	89.7	130.2	67.8	98.4
Russia	75.8	104.8	40.6	56.1
Germany	70.7	157.6	43.3	96.6
South Korea	50.1	188.1	40.8	153.3
United Kingdom	47.0	144.8	30.9	95.3
France	45.1	160.3	30.6	108.8
Italy	31.20	123.1	14.0	55.2
Spain	22.6	113.4	14.0	70.4
Poland	16.2	99.0	11.8	72.0
Netherlands	15.7	168.8	9.6	102.6
Turkey	15.4	55.1	11.2	40.1
United States			143.4	92.3

Note: Data for the United States and Turkey are from 2017.

Source: OECD, Main Science and Technology Indicators 2019-2.

The intensity of China's R&D manpower input has maintained steady growth year after year. Out of every 10,000 employed personnel, the number of R&D personnel rose from 33.6 person-years per 10,000 persons in 2010 to 56.5 person-years per 10,000 persons in 2018, for an average annual increase of 6.7%. Out of every 10,000 employed personnel, the number of R&D researchers rose from 15.9 person-years per 10,000 persons in 2010 to 24.1 person-years per 10,000 persons in 2018, for an average annual growth rate of 5.3%.

China's R&D manpower input intensity index still lags behind at an international level. In 2018, in countries where the total number of R&D personnel exceeds 100,000 person-years, the number of R&D personnel per 10,000 employed personnel in China is only slightly higher than that of Turkey. In most developed countries, the number of R&D personnel per 10,000 employed personnel is more than twice that of China. From the perspective of the number of R&D researchers per 10,000 employed personnel, in 2018, China ranked the lowest among the

countries with more than 100,000 R&D personnel-years, and the index value of most developed countries is about four times that of China.