

Research and development, 2016*

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Introduction

In 2016, over HUF 427 billion, 1.22% of GDP was spent on research and development activities at the level of the national economy. This amount at current prices was 8.8% lower compared to the previous year. R&D expenditure fell by 7.9% both at the research units of business enterprises as well as at the research and development institutes and other budgetary research units, and by 16.1% at research units in higher education.

R&D expenditure financed from the sources of business enterprises rose by 3.5% however the increase could not offset the decrease connected to the uses of financial sources – received from operational programmes – which are dedicated to research and development.

Table 1

Main indicators of research and development

Year	Research and development units ^a			
	employed persons ^a	of which: researchers	capital expenditure as a percentage of national investments	expenditure as a percentage of gross domestic product (GDP)
	as a percentage of total employment			
2010	0.84	0.57	0.79	1.15
2011	0.90	0.61	0.86	1.19
2012	0.93	0.62	1.33	1.27
2013	0.98	0.64	1.62	1.39
2014	0.91	0.64	1.15	1.36
2015	0.88	0.60	1.00	1.38
2016	0.82	0.59	0.96 ⁺	1.22 ⁺

a) Full-time equivalents (FTE).

⁺ Preliminary data.

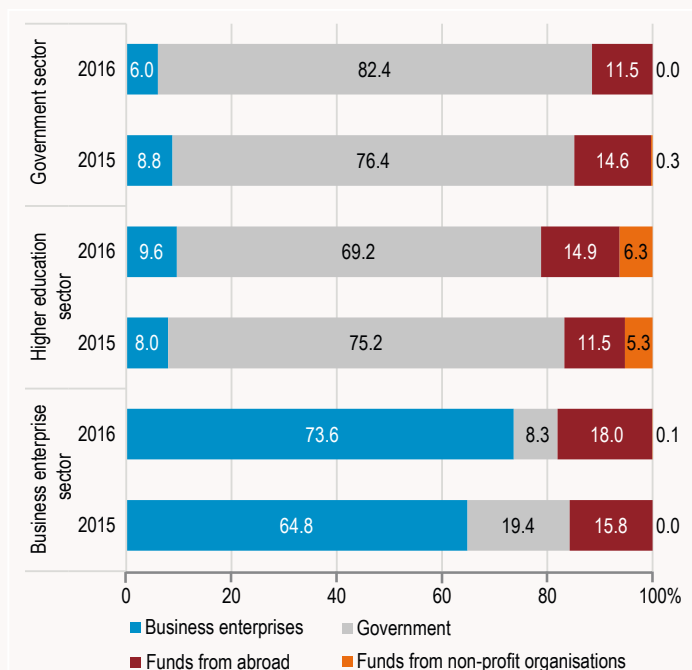
The trends observed in the previous years continued regarding the changes in the number of research units and in the headcount of staff performing R&D activities. In 2016, 2,727 research units were operating, 2.6% less than in the previous year. The headcount of R&D personnel – along with an increase of 1.3% in the number of researchers – decreased by 2.8%. The full-time equivalent R&D personnel lessened by 3%, while the full-time equivalent number of researchers increased

to a greater extent than the headcount of researchers, by 1.9%. The proportion of researchers in R&D personnel became higher: it was above 70% in the case of both the headcount and the full-time equivalent number of staff.

While the average staff number per research unit was 13.1, which remained almost the same (13.2) compared to the previous year, the average R&D expenditure per research unit fell to HUF 156.7 million. The number of technicians per 100 researchers also decreased, 28 technicians were recorded per 100 researchers (based on full-time equivalents) in 2015, compared with 24 in 2016.

Figure 1

Distribution of sources of R&D expenditure by sector



Out of the financial sources of research and development the role of business enterprises strengthened further in 2016 – with an increase of 3.5% compared to the previous year – it was over HUF 241 billion, its share in R&D expenditure rose from 49.7% in 2015 to 56.4%. The amount of funds from abroad was nearly HUF 71 billion, which was 1.2% higher compared to 2015. The share of both the government sector and the non-profit sector in financing decreased.

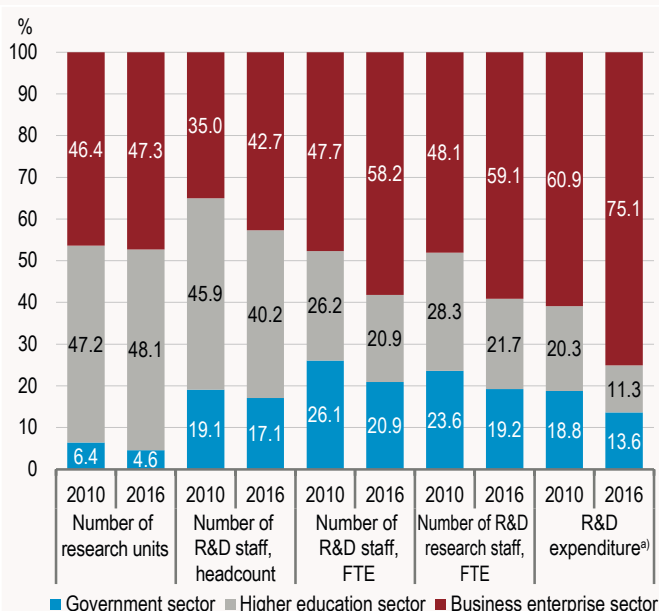
The changes of R&D capital expenditure in 2016 followed the trends of the national investments. In 2016, the amount of R&D capital expenditure fell to HUF 49,163 million from the HUF 59,589 million in 2015. The share of R&D capital expenditure in R&D expenditure fell from 12.9% in 2015 to 11.7%.

* The sum of figures may differ from the total due to rounding.

The role of R&D activities differed by sectors. The research units operating within business enterprises are of a growing significance year-on-year, while the higher education and the government sectors continued to show the signs of a slow decrease.

Figure 2

Distribution of main characteristics of R&D activities by sector



a) Excluding the honoraria and salary supplements based on scientific degrees and paid by government, and the amounts of state scientific scholarships.

Data on business enterprises' research units

In 2016, 1,291 business enterprises' research units operated in Hungary, 8.6% less than in the previous year. The proportion of business enterprises' research and development units employing fewer than 50 people was 73.4%, however their share in full-time equivalent R&D personnel was only 23.6% and in R&D expenditure it was 14.9%. The business enterprises having more than 500 persons employed nearly a half (49.9%) of the full-time equivalent total R&D personnel, and almost 60% of R&D expenditure was realised here.

The headcount of staff performing R&D activities at business enterprises was 23,349, which was 1.5% lower than in 2015. The number of researchers rose by 1.5% however that of technicians fell by 5.3%.

The distribution of people, performing R&D activities, by educational attainment did not change significantly. More than three quarters (79.0%) of people engaged in R&D activities had tertiary educational degree, within which 8.2% of them had PhD.

The proportion of women employed in the business enterprise sector developed similarly compared to the previous year. They represented 24.2% of the total R&D staff number in business enterprises and only 17.7% of researchers and developers.

More than half, 58.2% of the total full-time equivalent R&D personnel was employed at business enterprises' research units in 2016.

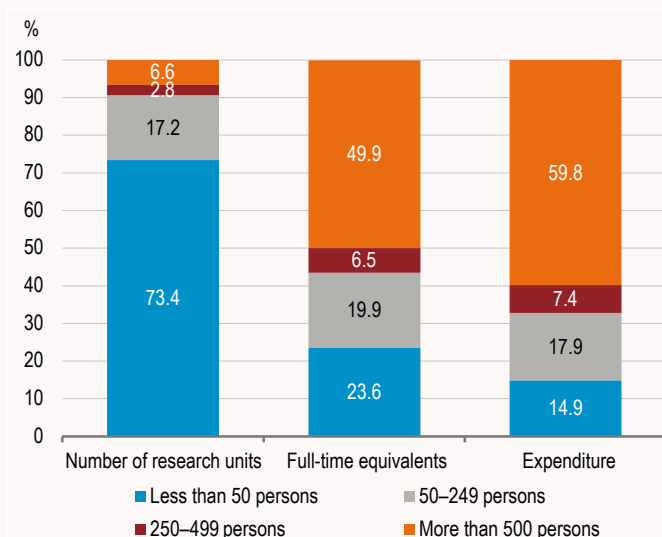
The full-time equivalent number of staff was 20,825, 1.0% less compared to one year earlier. The full-time equivalent number of researchers decreased by 3.5% in 2015, and grew by 1.5% in 2016. The number of technicians continued to decrease also in this year.

The business enterprises' research units spent nearly HUF 317 billion on R&D activities in 2016, which made up 74.1% of R&D expenditure at the level of the national economy. This proportion meant a growth of 0.7 percentage point compared to 2015. The proportion of R&D capital expenditure, within R&D expenditure, was 12.9% in 2016 (which was

83.3% of the total R&D capital expenditure) which amounted to nearly HUF 41 billion. The business enterprises spent the most on purchasing instruments and equipment as well as computer software also in this period, their proportion reached 74.7% compared with 73.4% in 2015.

Figure 3

Distribution of major data of business enterprises by employment size category, 2016



The role of business enterprises in financing expenditure on research and development activities rose significantly, from 64.8% to 73.6%, in this sector compared to the last year, which was considerably higher than the national average of 57.2%. In 2016, the proportion of funds from abroad increased by 2.2 percentage points, so after the decrease of 3.4 percentage points in 2015, approximated the 19.1% measured in 2014.

Table 2

Distribution of major data of business enterprises' R&D units by proprietor, 2016

				(%)
Proprietor	Number of R&D staff, head-count	Number of R&D staff	Of which: number of researchers	R&D expenditure
		full-time equivalents		
Hungarian- and mostly Hungarian-owned	37.2	34.1	27.0	18.7
Foreign- and mostly foreign-owned	59.3	62.8	70.1	77.8

Researches in the business enterprise sector are concentrated in foreign- or partly foreign-owned research units by form of ownership, and their weight was higher compared to the previous years. While in 2015, their share was two thirds both of the full-time equivalent number of researchers employed at all research units and of expenditure, these proportions moved to 70.1% and 77.8% in 2016.

Nearly half (48.3%) of the R&D expenditure of sections and divisions was spent on research by business enterprises operating in the field of manufacturing, within which manufacture of basic pharmaceutical products and pharmaceutical preparations as well as manufacture of transport

equipment were dominant with their expenditure of 35.8% and 28.5%, respectively. Out of the expenditure of pharmaceutical industry the amount spent on basic pharmaceutical products was nearly one and a half times more compared to 2015.

Data on higher education sector

The research activities of higher education sector are characterised by the fact that one research project can cover more fields of science, even more faculties and departments can participate in one topic. This is reflected by the number of research units, the number of staff performing R&D activities there and the amount of financial sources used.

As a result of the reorganisations took place in higher education in 2016, the number of the institutions fell to 65, however, within which the number of their units performing research and experimental development rose by 58. There were a total of 1,311 research units performing R&D activities, their proportion of all research units rose to 48%.

Within the staff of the universities and colleges 21,969 people were engaged in research and experimental development in some parts of their working time. The headcount of R&D personnel in the sector was practically the same as in the previous year. Within the total R&D staff the number of researchers increased by 2.5%, while that of technicians and other support staff became 5.2% and 8.0% less. As in 2016, the number of researchers rose higher than the average and that of technicians and other support staff decreased less than the average, their weight increased in all the three types of occupation compared to the other two sectors. 41% of researchers, 32% of technicians and 46% of other support staff were employed in this sector.

In higher education considerably more women, performing research and experimental development, were employed compared to the national average. Their proportion in the sector was almost 50%, and more than half of the total number of women researchers worked at research units in higher education. In 2016, the total number of women took place in R&D projects was 10,794, within which the number of researchers, technicians and other support staff was 6,398, 2,004 and 2,392, respectively.

Table 3

Major indicators of R&D activities in higher education sector, 2016

Denomination	Number of R&D units	Number of R&D staff, FTE	Of which: resea- rchers	R&D expendi- ture, million HUF
		persons		
Higher education sector	1,311	7,476	5,592	47,611
As a percentage of the total R&D units	48.1	20.9	21.7	11.1

The full-time equivalent number of staff performing scientific activities at universities and colleges continued to decrease, i.e. people working here spent less and less proportion of their working time on research: this proportion was 35% in 2015, and 34% in 2016, on average. In the examined period the full-time equivalent R&D personnel was more than 7 thousand, within this there were 5,592 researchers, 1,069 technicians and 815 other support staff. As a result of the increase in the number of research units and the decrease in the number of people performing research activities and in the proportion of their working time spent on research, the full-time equivalent number of staff per R&D unit, fell from 6.2 persons measured in the previous year to 5.7, which was less than the half of the national average (13.1 persons).

In 2016, higher education institutions spent HUF 47.6 billion on R&D activities. It was 16% less than one year earlier. The decrease of R&D expenditure was higher than the average. The average amount of expenditure per research unit spent on research and experimental development was HUF 36 million, instead of HUF 45 million.

In 2016, almost 93% of R&D expenditure was used as current R&D costs, this amounted to HUF 44 billion, which meant a decrease of more than 14% compared to 2015. Nearly three quarters of the current costs were personnel costs. The amount of R&D capital expenditure was HUF 3.6 billion, two thirds of the value in the previous year. Three quarters of the capital expenditure was spent on equipments, 22% of that on land and buildings and 2.7% of that on computer software.

A dominant proportion of the financial sources necessary for the scientific activities of higher education sector – as it was in the previous years – came from the government budget (69%) and barely a tenth of them from the business enterprises. 15% of the expenditure was financed from funds from abroad and 6% of that from non-profit organisations.

Similarly to the previous years, higher education sector had the most intensive publication activity, the number of books and chapters published in Hungarian and in foreign languages per 100 researchers was 130, that of articles was 299, which was more than three times the national average.

Table 4

Indicators of R&D activities in higher education sector by field of science, 2016

Field of science	Number of R&D staff, head-count	Of which: researchers	Number of R&D staff, FTE	Of which: researchers	R&D expenditure, million HUF
	per research unit				
Natural sciences	18.0	13.8	7.6	5.7	44.7
Engineering and technology	20.2	14.7	7.0	5.2	62.1
Medical and health sciences	29.2	16.0	8.5	5.3	45.8
Agricultural sciences	13.8	8.1	5.8	3.1	32.5
Social sciences	12.4	10.6	3.9	3.3	24.8
Humanities	13.0	11.1	4.1	3.6	25.7
Average	16.8	12.2	5.7	4.3	36.3

Researches in different fields of science have various needs regarding the human resources, the equipments and the expenditure. Typically, it is necessary to provide higher staff number and expenditure for researches in the field of natural sciences, medical and health sciences as well as of engineering and technology, however social sciences have the lowest staff number and amount of expenditure per research unit.

Data on government sector

In 2016, research and development institutes and other government research units made up 4.6% of the total number of research units operating in Hungary, the 125 research units were 10 units fewer than in the previous year.

In 2016, the headcount of R&D personnel in the government sector was 9,318 and the full-time equivalent number of staff was 7,456, which

meant a decrease of some 11% and 8.0%, respectively compared to the previous year. The headcount and the full-time equivalent number of the technicians employed in research institutes decreased by 28% and 27%, respectively which was the main reason of the decline in the total staff number. The number of women taking part in research activities (4,452 persons) was 13% less than in 2015, but their proportion is still relatively high. Among researchers the proportion of women was 42% in the government sector, and it was 31% at national level.

Table 5

Major indicators of R&D activities in government sector, 2016

Denomination	Number of R&D units	Number of R&D staff, FTE	Of which: researchers	R&D expenditure, million HUF
			persons	
Government sector	125	7,456	4,965	57,299
As a percentage of the total R&D units	4.6	20.9	19.2	13.4

The expenditure of the government sector's research units was over HUF 57 billion, after the increase in the previous year it fell by nearly 8.0%. In 2016, within the expenditure current R&D costs fell by 2.3% and moreover the R&D capital expenditure, showing significant fluctuations year-on-year, by 44% in this sector. Within the total R&D expenditure, current costs and capital expenditure accounted for 14% and 9.5%, respectively.

82% of the R&D expenditure of research and development institutes and other government research units was financed from government sources, and 12% of that came from funds from abroad. Business enterprises contributed to a decreasing extent to the financing of the researches in this sector, only 6% of the sources came from business enterprise sector in 2016.

In the government sector basic researches determined the R&D activities, 59% of the current costs was spent on them (at national level it was less than 19%).

Out of the major fields of science the highest amount was spent on natural sciences in this sector, nearly 55% of the expenditure was spent on this field in 2016, nearly HUF 1 billion more compared to the previous year. However, along with this only less than one third of the total research expenditure in natural sciences was realised in the government sector, the majority, 57% was spent in the business enterprise sector. Out of the fields of science a growth can be observed also in the financing of

agricultural researches, it was more than 1% compared to the previous year.

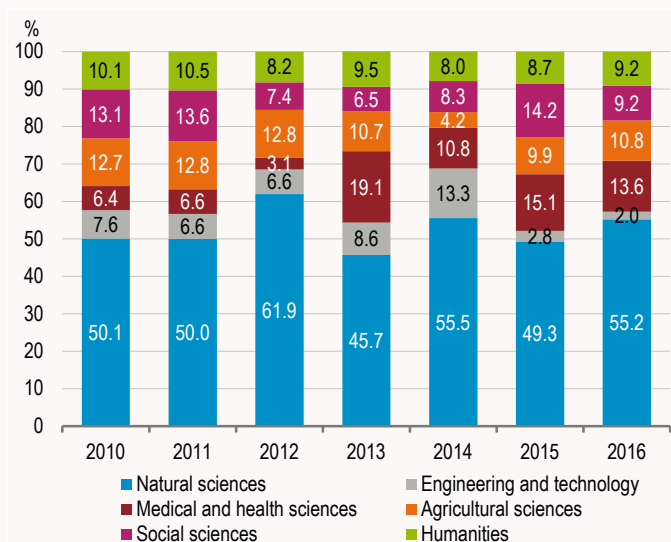
In 2016, 2,425 books and chapters were published in the research institutes belonging to the government sector, more than two thirds of them were published in Hungarian and one third of them in foreign languages. In the case of the 6,894 articles the publication was different: foreign-language and Hungarian-language publications accounted for two-thirds and only one third, respectively.

There were 49 books and chapters, 139 articles and 28 conference publications in this sector per 100 researchers. It has a middle position in the ranking beside the other two sectors.

In 2016, book publishing was characterised by the dominance of human sciences, 78% of Hungarian-language books and chapters and 74% of foreign-language ones were prepared in a theme of social sciences or humanities. In the case of Hungarian-language articles the distribution is similar, 70% of the articles was prepared in such themes, however in the case of foreign-language articles nearly two thirds, 66% was prepared in the theme of natural sciences, 20% in the theme of medical and health sciences, and all the rest fields of science accounted for the 15%.

Figure 4

Distribution of R&D expenditure of research and development institutes and other research units of government sector by field of science



Further information, data (links):

[Tables](#)

[Methodology](#)

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