

In 2017, total expenditure on Research and Development amounted to €65.9 million, or 0.58 per cent of GDP.

Research and Development in Malta: 2015-2017

R&D Expenditure

During 2017, an increase of €7.2 million was registered in total expenditure on R&D activities, equivalent to 12.3 per cent. The Business Enterprise sector contributed 65.3 per cent to total R&D, whereas the Higher Education and Government sectors contributed 33.8 and 0.9 per cent respectively (Table 1).

Primarily the R&D expenditure is dedicated to Basic Research, with a 52.1 per cent of total R&D in 2017, followed by Applied Research (32.6 per cent) and Experimental Development (15.3 per cent) (Table 2).

In 2017, both the Business Enterprise sector and the Higher Education Sector reported an increase in R&D expenditure compared to 2016. The higher R&D expenditure was triggered by higher outlays on recurrent expenditure of €7.6 and €2.8 million respectively. Capital expenditure for these two sectors dropped by €0.9 and €2.1 million respectively. The Government sector registered a drop of €0.2 million, primarily in recurrent expenditure. Labour costs represented 72.2 per cent of total R&D expenditure, followed by recurrent expenditure (20.7 per cent) and capital projects (7.1 per cent) (Table 3).

In 2017, the highest rate of R&D activity was recorded in Engineering and Technology which accounted for 45.7 per cent of total expenditure, followed by Natural Sciences (22.0 per cent) and Medical Sciences (16.0 per cent). Year-on-year comparisons show that the highest increase was registered in Natural Sciences €3.7 million followed by Medical Sciences €3.4 million. The majority of R&D activity in Engineering and Technology and Natural Sciences was undertaken in business enterprises whereas research in relation to Medical and Social Sciences was mainly carried out by the Higher Education sector (Table 4).

Each sector mostly funds its own research, supplemented by foreign funds, mainly local business enterprise funds for the Business Enterprise sector, general university funds for the Higher Education sector and EU funds or Direct Government funds for the Government sector. Foreign funds for R&D reached €7.1 million, or 10.8 per cent of total funds (Table 5).

R&D Employment

In 2017, 2,479 employees were engaged in R&D work, of who 1,451 dedicated part of their time to R&D. The highest R&D employment rate was registered in the Higher Education sector, at 1,280 employees, followed by the Business Enterprise sector, with 1,117 employees. Male employment was predominant among researchers and technicians, while females led the support staff category. Females accounted for 34.7 per cent of total R&D employment (Table 6).

With regard to employment by major field of science, in 2017 the highest employment activity in R&D was recorded in Engineering and Technology with 806 employees, followed by Natural Sciences and Social Sciences, with 607 and 450 employees respectively (Table 7).

GBARD

In 2018, the highest outlays of Government budget allocations for R&D (GBARD) were recorded in the socio-economic activities related to Health (€6.0 million), Culture, recreation, religion and media (€4.4 million), Political and social systems, structures and processes and Industrial production and technology (both €4.1 million). Compared to 2017, GBARD increased by €3.8 million (Table 8) ■

Table 1. Total R&D Expenditure as a percentage of GDP*

| | €000s | | |
|----------------------------------|---------------|---------------|---------------|
| | 2015 | 2016 | 2017 |
| Government Sector (GOV) | 11,803 | 764 | 607 |
| Business Enterprise Sector (BES) | 36,729 | 36,366 | 43,072 |
| Higher Education Sector (HES) | 22,960 | 21,571 | 22,248 |
| Total R&D expenditure | 71,491 | 58,702 | 65,928 |
| % of GDP | 0.74 | 0.57 | 0.58 |

* Source: Gross Domestic Product as published in News Release No. 090/2019

Note: Totals may not add up due to rounding

Chart 1. R&D Expenditure by sector of performance

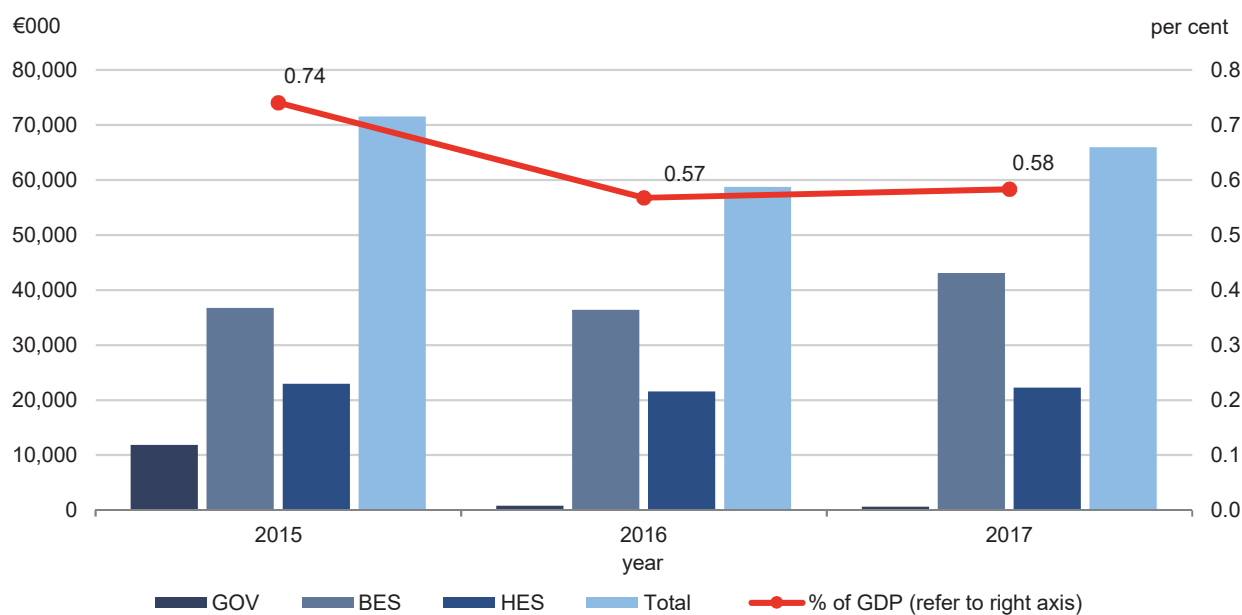


Table 2. Total expenditure on R&D by type of activity

| | €000s | | | |
|--------------------------|---------------|---------------|---------------|---------------|
| | GOV | BES | HES | Total |
| 2015 | | | | |
| Basic Research | 11,249 | 13,938 | 22,862 | 48,048 |
| Applied Research | 554 | 16,131 | 98 | 16,783 |
| Experimental Development | 0 | 6,660 | 0 | 6,660 |
| Total | 11,803 | 36,729 | 22,960 | 71,491 |
| 2016 | | | | |
| Basic Research | 182 | 10,026 | 21,507 | 31,715 |
| Applied Research | 582 | 18,532 | 65 | 19,179 |
| Experimental Development | 0 | 7,808 | 0 | 7,808 |
| Total | 764 | 36,366 | 21,571 | 58,702 |
| 2017 | | | | |
| Basic Research | 457 | 11,761 | 22,135 | 34,353 |
| Applied Research | 150 | 21,245 | 114 | 21,509 |
| Experimental Development | 0 | 10,066 | 0 | 10,066 |
| Total | 607 | 43,072 | 22,248 | 65,928 |

Note: Totals may not add up due to rounding

Table 3. Total expenditure on R&D by type of costs

€000s

| | GOV | BES | HES | Total |
|------------------------------|---------------|---------------|---------------|---------------|
| 2015 | | | | |
| Recurrent Expenditure | 1,071 | 30,444 | 19,415 | 50,930 |
| Labour Costs | 740 | 23,080 | 15,449 | 39,269 |
| Other Recurrent Expenditure | 331 | 7,365 | 3,966 | 11,661 |
| Capital Expenditure | 10,732 | 6,285 | 3,544 | 20,561 |
| Land and Buildings | 10,487 | 1,055 | 1,620 | 13,163 |
| Instruments and Equipment | 244 | 5,229 | 1,924 | 7,398 |
| Total Expenditure | 11,803 | 36,729 | 22,960 | 71,491 |
| 2016 | | | | |
| Recurrent Expenditure | 749 | 32,084 | 18,206 | 51,040 |
| Labour Costs | 652 | 26,158 | 14,414 | 41,225 |
| Other Recurrent Expenditure | 97 | 5,926 | 3,792 | 9,814 |
| Capital Expenditure | 15 | 4,282 | 3,365 | 7,662 |
| Land and Buildings | 15 | 764 | 1,164 | 1,943 |
| Instruments and Equipment | 0 | 3,517 | 2,201 | 5,719 |
| Total Expenditure | 764 | 36,366 | 21,571 | 58,702 |
| 2017 | | | | |
| Recurrent Expenditure | 599 | 39,715 | 20,966 | 61,280 |
| Labour Costs | 496 | 29,649 | 17,477 | 47,622 |
| Other Recurrent Expenditure | 103 | 10,066 | 3,489 | 13,657 |
| Capital Expenditure | 8 | 3,357 | 1,283 | 4,648 |
| Land and Buildings | 6 | 618 | 523 | 1,147 |
| Instruments and Equipment | 2 | 2,739 | 760 | 3,501 |
| Total Expenditure | 607 | 43,072 | 22,248 | 65,928 |

Note: Totals may not add up due to rounding

Chart 2. R&D Expenditure by type of costs: 2017

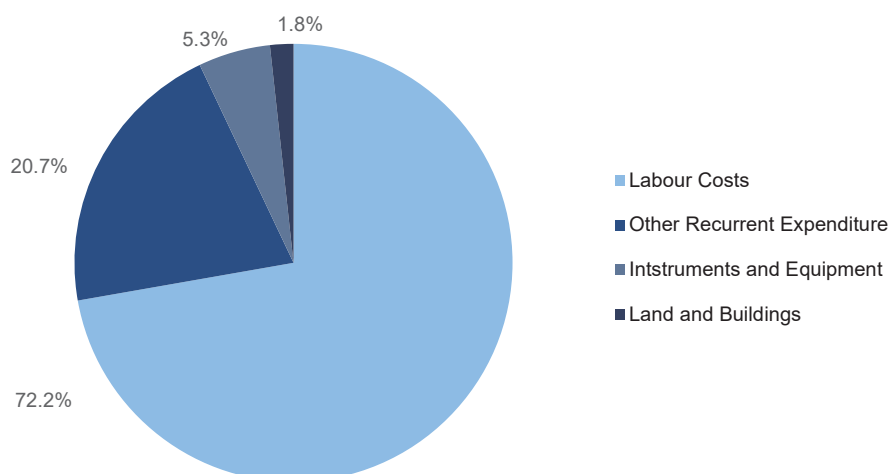


Table 4. Total expenditure on R&D by major field of science

€000s

| | | Natural sciences | Engineering and Technology | Medical sciences | Agricultural sciences | Social sciences | Humanities | Total |
|-------|------|------------------|----------------------------|------------------|-----------------------|-----------------|------------|--------|
| GOV | 2015 | 25 | 70 | 8,638 | 3,044 | 0 | 25 | 11,803 |
| | 2016 | 0 | 0 | 172 | 441 | 85 | 67 | 764 |
| | 2017 | 28 | 0 | 0 | 239 | 290 | 50 | 607 |
| BES | 2015 | 11,939 | 20,118 | 3,683 | 322 | 141 | 525 | 36,729 |
| | 2016 | 8,638 | 24,806 | 2,224 | 241 | 315 | 143 | 36,366 |
| | 2017 | 12,173 | 25,609 | 5,104 | 59 | 81 | 46 | 43,072 |
| HES | 2015 | 2,627 | 4,454 | 5,137 | 366 | 6,639 | 3,737 | 22,960 |
| | 2016 | 2,112 | 4,294 | 4,753 | 247 | 6,506 | 3,659 | 21,571 |
| | 2017 | 2,293 | 4,546 | 5,421 | 302 | 6,404 | 3,283 | 22,248 |
| Total | 2015 | 14,591 | 24,641 | 17,458 | 3,733 | 6,780 | 4,288 | 71,491 |
| | 2016 | 10,750 | 29,100 | 7,149 | 929 | 6,906 | 3,869 | 58,702 |
| | 2017 | 14,493 | 30,155 | 10,525 | 601 | 6,775 | 3,379 | 65,928 |

Table 5. Source of funds of R&D expenditure

€000s

| Sources of Funds | GOV | | | BES | | | HES | | | Total | | |
|------------------------------|---------------|------------|------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 |
| Local Funds | 2,646 | 758 | 600 | 33,478 | 32,222 | 38,013 | 20,787 | 19,420 | 20,220 | 56,910 | 52,400 | 58,833 |
| Business Enterprise | 160 | 160 | 0 | 32,411 | 31,721 | 36,994 | 51 | 93 | 164 | 32,622 | 31,974 | 37,158 |
| Direct Government | 2,486 | 598 | 600 | 1,066 | 501 | 941 | 2,419 | 1,461 | 751 | 5,971 | 2,559 | 2,292 |
| General University Funds | 0 | 0 | 0 | 0 | 0 | 25 | 17,488 | 17,023 | 18,331 | 17,488 | 17,023 | 18,356 |
| Others ¹ | 0 | 0 | 0 | 1 | 0 | 53 | 829 | 844 | 974 | 830 | 844 | 1,027 |
| Foreign Funds | 9,157 | 7 | 7 | 3,251 | 4,143 | 5,059 | 2,173 | 2,152 | 2,028 | 14,581 | 6,302 | 7,094 |
| Foreign Business Enterprises | 0 | 0 | 0 | 1,536 | 2,987 | 4,005 | 0 | 0 | 0 | 1,536 | 2,987 | 4,005 |
| European Commission | 9,157 | 0 | 0 | 1,575 | 1,017 | 1,054 | 1,309 | 1,255 | 1,224 | 12,040 | 2,271 | 2,279 |
| Others ¹ | 0 | 7 | 7 | 140 | 140 | 0 | 864 | 897 | 804 | 1,004 | 1,044 | 811 |
| Total | 11,803 | 764 | 607 | 36,729 | 36,366 | 43,072 | 22,960 | 21,571 | 22,248 | 71,491 | 58,702 | 65,928 |

(1) Others category may include private non-profit organisations, international organisations and foreign higher education institutions.

Table 6. Total employment in R&D by sex and occupation

| | Headcount | | | | | | | | | | | |
|------------------------|-----------|-----------|-----------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | GOV | | | BES | | | HES | | | Total | | |
| | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 | 2015 | 2016 | 2017 |
| Full-time | 29 | 29 | 7 | 807 | 904 | 937 | 55 | 69 | 84 | 891 | 1,002 | 1,028 |
| Males | 27 | 26 | 6 | 655 | 718 | 713 | 28 | 42 | 50 | 710 | 786 | 769 |
| Females | 2 | 3 | 1 | 152 | 186 | 224 | 27 | 27 | 34 | 181 | 216 | 259 |
| Part-Time ¹ | 43 | 50 | 75 | 219 | 207 | 180 | 1,222 | 1,149 | 1,196 | 1,484 | 1,406 | 1,451 |
| Males | 28 | 37 | 40 | 176 | 158 | 139 | 706 | 666 | 672 | 910 | 861 | 851 |
| Females | 15 | 13 | 35 | 43 | 49 | 41 | 516 | 483 | 524 | 574 | 545 | 600 |
| Total | 72 | 79 | 82 | 1,026 | 1,111 | 1,117 | 1,277 | 1,218 | 1,280 | 2,375 | 2,408 | 2,479 |
| Males | 55 | 63 | 46 | 831 | 876 | 852 | 734 | 708 | 722 | 1,620 | 1,647 | 1,620 |
| Females | 17 | 16 | 36 | 195 | 235 | 265 | 543 | 510 | 558 | 755 | 761 | 859 |
| Researchers | 34 | 33 | 32 | 515 | 584 | 591 | 863 | 853 | 923 | 1,412 | 1,470 | 1,546 |
| Males | 25 | 23 | 25 | 407 | 454 | 444 | 577 | 571 | 599 | 1,009 | 1,048 | 1,068 |
| Females | 9 | 10 | 7 | 108 | 130 | 147 | 286 | 282 | 324 | 403 | 422 | 478 |
| Technicians | 3 | 2 | 1 | 300 | 296 | 352 | 121 | 107 | 106 | 424 | 405 | 459 |
| Males | 3 | 2 | 1 | 275 | 267 | 287 | 91 | 82 | 77 | 369 | 351 | 365 |
| Females | 0 | 0 | 0 | 25 | 29 | 65 | 30 | 25 | 29 | 55 | 54 | 94 |
| Support staff | 35 | 44 | 49 | 211 | 231 | 174 | 293 | 258 | 251 | 539 | 533 | 474 |
| Males | 27 | 38 | 20 | 149 | 155 | 121 | 66 | 55 | 46 | 242 | 248 | 187 |
| Females | 8 | 6 | 29 | 62 | 76 | 53 | 227 | 203 | 205 | 297 | 285 | 287 |

(1) Spending a proportion of their working time on R&D activities

Chart 3. R&D Employment: 2017

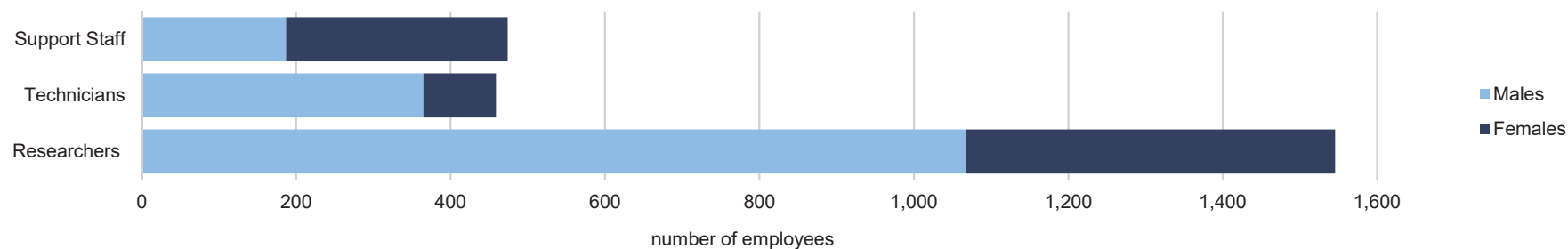


Table 7. R&D employment by major field of science

| | | Headcount | | | | | | |
|-------|------|------------------|----------------------------|------------------|-----------------------|-----------------|------------|-------|
| | | Natural sciences | Engineering and Technology | Medical sciences | Agricultural sciences | Social sciences | Humanities | Total |
| GOV | 2015 | 1 | 0 | 10 | 60 | 0 | 1 | 72 |
| | 2016 | 0 | 0 | 16 | 49 | 13 | 1 | 79 |
| | 2017 | 0 | 0 | 3 | 32 | 45 | 2 | 82 |
| BES | 2015 | 489 | 411 | 41 | 4 | 14 | 67 | 1,026 |
| | 2016 | 502 | 508 | 40 | 2 | 24 | 35 | 1,111 |
| | 2017 | 475 | 548 | 66 | 1 | 6 | 21 | 1,117 |
| HES | 2015 | 134 | 251 | 280 | 18 | 382 | 212 | 1,277 |
| | 2016 | 119 | 246 | 272 | 17 | 376 | 188 | 1,218 |
| | 2017 | 132 | 258 | 283 | 16 | 399 | 192 | 1,280 |
| Total | 2015 | 624 | 662 | 331 | 82 | 396 | 280 | 2,375 |
| | 2016 | 621 | 754 | 328 | 68 | 413 | 224 | 2,408 |
| | 2017 | 607 | 806 | 352 | 49 | 450 | 215 | 2,479 |

Table 8. Government Budget Allocations for R&D (GBARD)

| | | | | €000s |
|--|---------------|---------------|---------------|---------------|
| Socio-economic objective | 2015 | 2016 | 2017 | 2018 |
| Exploration and exploitation of the earth | 0 | 0 | 0 | 1 |
| Environment | 2,154 | 1,749 | 1,848 | 3,027 |
| Exploration and exploitation of space | 0 | 0 | 0 | 308 |
| Transport, telecommunication and other infrastructures | 0 | 50 | 72 | 29 |
| Energy | 22 | 69 | 106 | 31 |
| Industrial production and technology | 4,377 | 3,825 | 4,479 | 4,065 |
| Health | 6,484 | 4,679 | 5,285 | 6,017 |
| Agriculture | 1,019 | 515 | 516 | 1,263 |
| Education | 2,397 | 2,263 | 2,404 | 2,565 |
| Culture, recreation, religion and media | 4,182 | 4,303 | 3,972 | 4,355 |
| Political and social systems, structures and processes | 4,389 | 3,385 | 3,225 | 4,084 |
| General advancement of knowledge | 0 | 0 | 0 | 0 |
| Defence | 0 | 0 | 0 | 0 |
| TOTAL | 25,023 | 20,839 | 21,906 | 25,746 |

Methodological Notes

1. Research and Development is defined as creative work undertaken on a systematic basis to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.
2. R&D is classified in four main sectors:
 - *Government Sector (GOV)* - includes all Government Ministries and Departments, offices and other bodies which furnish, but normally do not sell to the community, those services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community.
 - *Business Enterprise Sector (BES)* - includes all firms, organisations and institutions whose primary activity is the market production of goods and services (other than higher education) for sale to the general public at economically significant prices.
 - *Higher Education Sector (HES)* - includes all universities, colleges of technology and other institutions of post-secondary education, whatever their source of finance or legal status.
 - *Private Non-Profit Sector (PNP)* - includes non-market, private non-profit institutions serving households and private individuals or households. This sector is not captured as it is considered to be negligible.
3. R&D covers 3 types of activity:
 - *Basic Research* - refers to experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
 - *Applied Research* - refers to original investigation undertaken in order to acquire new knowledge.
 - *Experimental Development* - refers to systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.
4. For the Government and Higher Education sectors, an annual questionnaire is compiled and sent to all the Central Government Ministries and Departments, Extra Budgetary Units, as well as Local Councils.
5. For the Business Enterprise sector, an annual questionnaire is sent to all known active R&D enterprises.
6. The data contained in this news release have been drawn up in line with the Frascati Manual (2015 edition). The definitions of the fields of science and technology and their sub-fields are available online: [http://nso.gov.mt/en/nso/Sources_and_Methods/Unit_A2/Public_Finance/Pages/Research-and-Development-in-Malta-\(Government-Sector\).aspx](http://nso.gov.mt/en/nso/Sources_and_Methods/Unit_A2/Public_Finance/Pages/Research-and-Development-in-Malta-(Government-Sector).aspx)
7. All data in this release should be considered as provisional and therefore subject to revision.
8. More information relating to this news release may be accessed at:

Statistical Concepts: <http://nso.gov.mt/metadata/concepts.aspx>

Metadata: <http://nso.gov.mt/metadata/reports.aspx?id=3> (GOV and HES)

Metadata: <https://nso.gov.mt/metadata/reports.aspx?id=26> (BES)

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