

In 2019, total expenditure on Research and Development amounted to €80.0 million, or 0.6 per cent of GDP.

Research and Development in Malta: 2017-2019

R&D Expenditure

During 2019, an increase in total expenditure on R&D activities of €5.4 million, or 7.3 per cent, was registered. The Business Enterprise sector contributed 62.0 per cent to total R&D, whereas the Higher Education and Government sectors contributed 37.0 and 1.0 per cent respectively (Table 1).

The R&D expenditure was primarily dedicated to Basic Research, which accounted for 51.3 per cent of total R&D in 2019, followed by Applied Research (34.4 per cent) and Experimental Development (14.3 per cent) (Table 2).

In 2019, both the Business Enterprise and the Higher Education sectors reported an increase in R&D expenditure compared to 2018. The higher R&D expenditure was mainly triggered by higher outlays by the Higher Education sector on recurrent expenditure of €1.8 million, while capital expenditure for these sectors increased by €2.8 million and €1.1 million, respectively. On the other hand, the Government sector experienced a drop of €0.1 million from 2018. Labour costs represented 62.3 per cent of total R&D expenditure, followed by Other recurrent expenditure (25.3 per cent) and Capital expenditure (12.3 per cent) (Table 3).

In 2019, the highest R&D expenditure was recorded in Engineering and technology, which accounted for 43.8 per cent of total expenditure, followed by Natural sciences (25.3 per cent) and Medical sciences (13.8 per cent). The majority of the R&D activity in Engineering and technology and Natural sciences was undertaken in the Business Enterprise sector, whereas research in relation to Medical and Social sciences was mainly carried out by the Higher Education sector. Year-on-year comparisons show that the highest increase was registered in Engineering and technology (€3.8 million), followed by Medical sciences (€0.9 million) and Humanities (€0.4 million) (Table 4).

Each sector mostly funds its own research, supplemented by foreign funds. Local business enterprise funds for the Business Enterprise sector, General university funds for the Higher Education sector and Direct government funds for the Government sector. Foreign funds for R&D reached €7.0 million, or 8.7 per cent, of total funds (Table 5).

R&D Employment

In 2019, 2,570 employees were engaged in R&D work, of whom 1,538 spent a portion of their time on R&D projects, while the remaining 1,032 employees dedicated their entire working time on R&D projects. The highest R&D employment was registered in the Higher Education sector, at 1,408 employees, followed by the Business Enterprise sector, with 1,129 employees. Male employment was predominant among researchers and technicians. Females accounted for 35.7 per cent of total R&D employment (Table 6).

With regard to R&D employment by major field of science, in 2019, the highest employment was recorded in Engineering and technology, with 752 employees, followed by Natural and Social sciences, with 704 and 463 employees respectively (Table 7).

R&D Government Budget Allocations

In 2020, Government budget allocations for R&D (GBARD) amounted to €30.0 million, a drop of €0.2 million when compared to 2019. The highest GBARD outlays were recorded in socio-economic activities related to Health (€6.5 million), Industrial production and technology (€5.1 million) and Culture, recreation, religion and media (€5.0 million) (Table 8) ■

Table 1. Total R&D expenditure as a % of GDP by year and sector ¹

	€000s		
	2017	2018	2019
Government (GOV)	607	861	761
Business Enterprise (BES)	43,072	46,992	49,600
Higher Education (HES)	22,248	26,773	29,689
Total R&D expenditure	65,928	74,626	80,050
% of GDP	0.56	0.59	0.59

¹ Gross Domestic Product as published in [News Release No. 097/2021](#)

Note: Totals may not add up due to rounding

Chart 1. R&D expenditure by sector

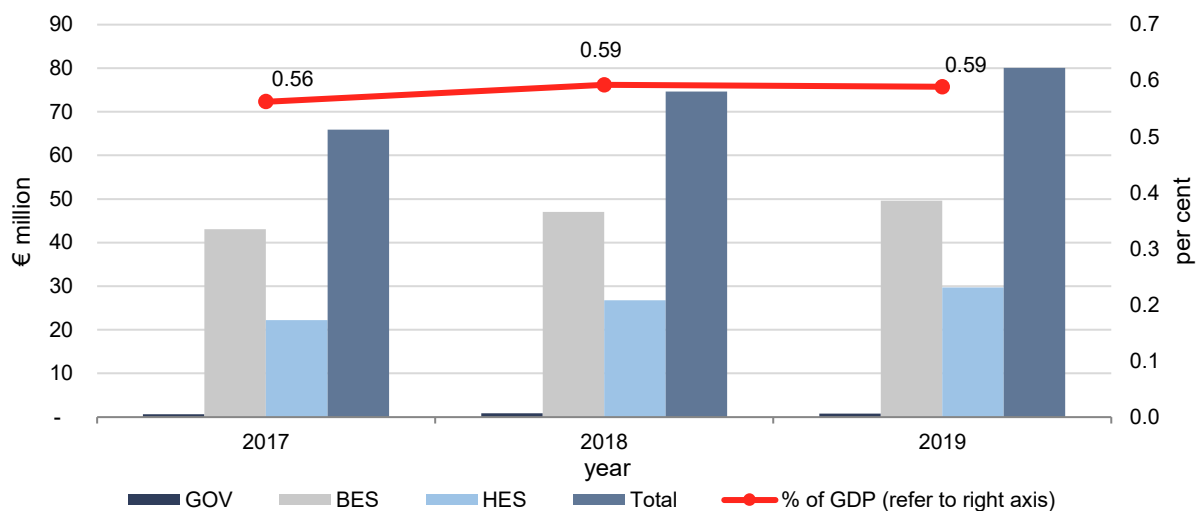


Table 2. Total expenditure on R&D by sector, year and type of activity

	€000s			
	GOV	BES	HES	Total
2017				
Basic Research	457	11,761	22,135	34,353
Applied Research	150	21,245	114	21,509
Experimental Development	0	10,066	-	10,066
Total	607	43,072	22,248	65,928
2018				
Basic Research	456	11,997	26,491	38,945
Applied Research	334	24,268	282	24,884
Experimental Development	71	10,726	-	10,798
Total	861	46,992	26,773	74,626
2019				
Basic Research	24	11,767	29,269	41,059
Applied Research	737	26,394	421	27,551
Experimental Development	-	11,440	-	11,440
Total	761	49,600	29,689	80,050

Note: Totals may not add up due to rounding

Table 3. Total expenditure on R&D by sector, year and type of costs

	€000s			
	GOV	BES	HES	Total
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
2018				
Recurrent expenditure	748	42,772	25,232	68,751
Labour costs	665	29,578	20,405	50,648
Other recurrent expenditure	82	13,194	4,827	18,104
Capital expenditure	114	4,220	1,541	5,875
Land and buildings	107	1,055	195	1,357
Instruments and equipment	6	3,165	1,347	4,518
Total expenditure	861	46,992	26,773	74,626
2019				
Recurrent expenditure	507	42,609	27,056	70,172
Labour costs	450	29,457	19,994	49,900
Other recurrent expenditure	57	13,152	7,062	20,272
Capital expenditure	254	6,990	2,633	9,877
Land and buildings	196	1,272	371	1,839
Instruments and equipment	58	5,718	2,263	8,038
Total expenditure	761	49,600	29,689	80,050

Note: Totals may not add up due to rounding

Chart 2. R&D expenditure by type of costs: 2019

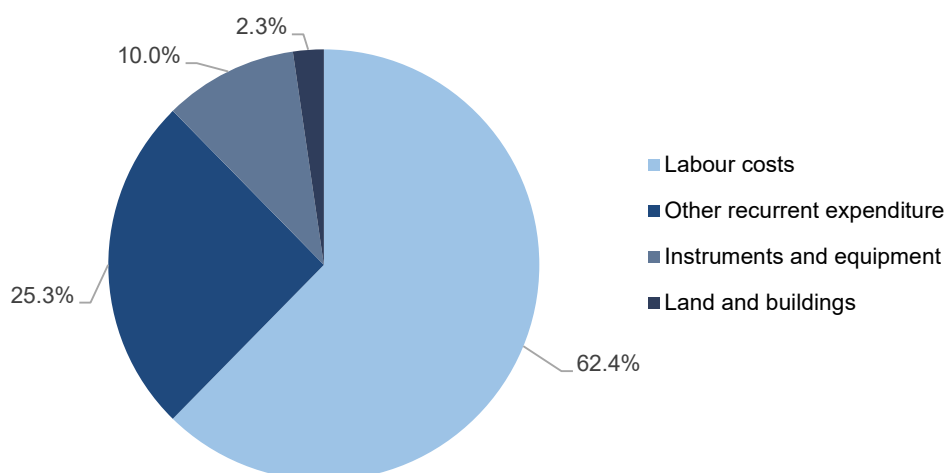


Table 4. Total expenditure on R&D by major field of science, sector and year

		€000s						
		Natural sciences	Engineering and technology	Medical sciences	Agricultural sciences	Social sciences	Humanities	Total
GOV	2017	28	0	-	239	290	50	607
	2018	-	-	-	413	372	77	861
	2019	-	108	52	517	-	85	761
BES	2017	12,173	25,609	5,104	59	81	46	43,072
	2018	16,046	26,892	3,761	168	105	19	46,992
	2019	14,902	29,572	4,851	119	130	26	49,600
HES	2017	2,293	4,546	5,421	302	6,404	3,283	22,248
	2018	4,159	4,353	6,387	411	7,743	3,720	26,773
	2019	5,336	5,396	6,146	469	8,197	4,146	29,689
Total	2017	14,493	30,155	10,525	601	6,775	3,379	65,928
	2018	20,204	31,245	10,148	993	8,219	3,816	74,626
	2019	20,238	35,076	11,048	1,104	8,328	4,256	80,050

Table 5. Source of funds of R&D expenditure by sector and year

		€000s											
		GOV			BES			HES			Total		
		2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
Sources of funds													
Local funds		600	833	761	38,013	44,592	47,089	20,220	22,592	25,208	58,833	68,017	73,057
Business enterprise		-	-	-	36,994	44,158	46,544	164	310	411	37,158	44,468	46,956
Direct government		600	833	761	941	433	545	751	1,596	2,968	2,292	2,863	4,273
General university funds		-	-	-	-	-	-	18,331	19,444	20,683	18,331	19,444	20,683
Others		-	-	-	78	-	-	974	1,241	1,146	1,052	1,241	1,146
Foreign funds		7	28	-	5,059	2,400	2,511	2,028	4,181	4,482	7,094	6,609	6,992
Foreign business enterprises		-	-	-	4,005	1,238	1,605	-	-	-	4,005	1,238	1,605
European Commission		-	21	-	1,054	1,162	895	1,224	2,539	2,780	2,279	3,722	3,675
Others		7	7	-	-	-	10	804	1,643	1,702	811	1,650	1,712
Total		607	861	761	43,072	46,992	49,600	22,248	26,773	29,689	65,928	74,626	80,050

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

Headcount

	GOV			BES			HES			Total		
	2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019
Full-time	7	12	12	937	880	872	84	100	148	1,028	992	1,032
Males	6	9	11	713	676	655	50	63	96	769	748	762
Females	1	3	1	224	204	217	34	37	52	259	244	270
Part-Time ¹	75	71	21	180	210	257	1,196	1,229	1,260	1,451	1,510	1,538
Males	40	36	16	139	157	183	672	671	691	851	864	890
Females	35	35	5	41	53	74	524	558	569	600	646	648
Total	82	83	33	1,117	1,090	1,129	1,280	1,329	1,408	2,479	2,502	2,570
Males	46	45	27	852	833	838	722	734	787	1,620	1,612	1,652
Females	36	38	6	265	257	291	558	595	621	859	890	918
Researchers	32	32	17	591	536	525	923	945	1,017	1,546	1,513	1,559
Males	25	21	12	444	398	377	599	607	650	1,068	1,026	1,039
Females	7	11	5	147	138	148	324	338	367	478	487	520
Technicians	1	2	5	352	350	382	106	108	105	459	460	492
Males	1	2	4	287	284	319	77	75	81	365	361	404
Females	-	-	1	65	66	63	29	33	24	94	99	88
Support staff	49	49	11	174	204	222	251	276	286	474	529	519
Males	20	22	11	121	151	142	46	52	56	187	225	209
Females	29	27	-	53	53	80	205	224	230	287	304	310

¹ Spending a portion of their working time on R&D activities

Chart 3. R&D Employment: 2019

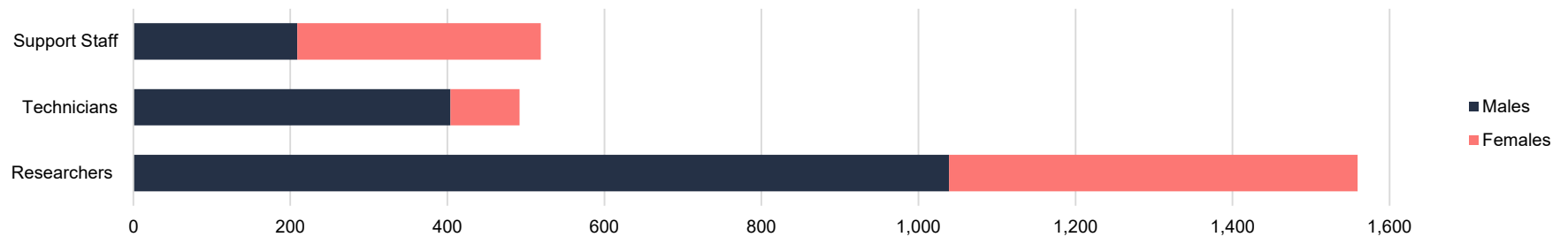


Table 7. R&D employment by major field of science, sector and year

								Headcount
		Natural sciences	Engineering and technology	Medical sciences	Agricultural sciences	Social sciences	Humanities	Total
GOV	2017	0	-	3	32	45	2	82
	2018	3	-	7	30	40	3	83
	2019	5	-	3	22	1	2	33
BES	2017	475	548	66	1	6	21	1,117
	2018	488	524	50	10	2	16	1,090
	2019	472	518	95	7	21	16	1,129
HES	2017	132	258	283	16	399	192	1,280
	2018	211	206	284	30	408	190	1,329
	2019	227	234	289	16	441	201	1,408
Total	2017	607	806	352	49	450	215	2,479
	2018	702	730	341	70	450	209	2,502
	2019	704	752	387	45	463	219	2,570

Table 8. Government Budget Allocations for R&D (GBARD) by year and socio-economic objective

Socio-economic objective	€000s			
	2017	2018	2019	2020
Exploration and exploitation of the earth	-	1	148	343
Environment	1,848	3,014	3,313	3,687
Exploration and exploitation of space	-	308	480	315
Transport, telecommunication and other infrastructures	72	64	258	272
Energy	106	31	45	200
Industrial production and technology	4,479	4,173	5,565	5,068
Health	5,285	6,051	6,234	6,492
Agriculture	516	1,398	1,784	1,510
Education	2,404	2,557	3,006	3,142
Culture, recreation, religion and media	3,972	4,354	4,992	5,022
Political and social systems, structures and processes	3,225	4,008	4,409	3,938
General advancement of knowledge	-	-	-	-
Defence	-	-	-	-
TOTAL	21,906	25,960	30,234	29,989

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 activities may be aimed at achieving either specific or general objectives. R&D is always aimed at new findings, based on original concepts (and their interpretation) or hypotheses. It is largely uncertain about its final outcome (or at least about the quantity of time and resources needed to achieve it), it is planned for and budgeted (even when carried out by individuals), and it is aimed at producing results that could be either freely transferred or traded in a marketplace.
3. R&D covers 3 types of activity:
 - i. *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.
 - ii. *Applied Research* - refers to original investigation undertaken in order to acquire new knowledge.
 - iii. *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. If the primary objective of the work is to conduct research on something relevant to the entity or make improvements to products or processes, then the work falls under the definition of R&D. On the other hand, if the product, process or approach is substantially set and the primary objective is to develop markets, do pre-production planning or get a production or control system working smoothly, then the work does not qualify as R&D.
5. This is a list of activities that are excluded from R&D. However, should the activities below be undertaken as part of an R&D process, they are considered as part of R&D:
 - i. All education and training of personnel in universities and special institutions of higher and post-secondary education.
 - ii. Scientific and technical information services such as collecting, coding, recording, classifying, dissemination, translating, analysing and evaluating by scientific and technical personnel, bibliographic services, patent statistics, scientific and technical information, extension and advisory services and scientific conferences.
 - iii. General purpose data collection is undertaken generally by government agencies to record natural, biological or social phenomena that are of general public interest or that only the government has the resource to record. Examples are routine topographical mapping; routine geological, hydrological, and meteorological surveying; astronomical observations. Hence, data collected for other or general purposes and not as part of an R&D process, such as quarterly sampling of unemployment, should be excluded from R&D even if exploited for research. Market surveys should also be excluded.
 - iv. Testing and maintenance of national standards, the calibration of secondary standards and routine testing and analysis of materials, components, products, processes, soils, atmosphere, etc.
 - v. Feasibility studies, including the investigation of proposed engineering projects, using existing techniques to provide additional information before deciding on implementation.
 - vi. Specialised health care concerning routine investigation and normal application of specialised medical knowledge.
 - vii. Patent and license work, including all administrative and legal work connected with patents and licenses.
 - viii. Policy-related studies cover a range of activities, such as the analysis and assessment of the existing programmes, policies and operations of government departments; the work of units concerned with the continuing analysis and monitoring of external phenomena (e.g. defence and security analysis); and the work of legislative commissions of inquiry with general government or departmental policy or operations.
 - ix. Routine software development are not considered to be R&D. Technical problems that have been overcome in previous projects on the same operating systems and computer architecture are also excluded. This also includes routine computer maintenance.
6. The link between the Business R&D and Innovation data is that R&D is just one out of the eight activities that an enterprise can conduct in order to be considered as Innovative. The eight types of innovative activities are the following:
 - i. Research and experimental development (R&D) activities.
 - ii. Engineering, design and other creative work activities.

- iii. Marketing and brand equity activities.
 - iv. Intellectual Property related activities.
 - v. Employee training activities.
 - vi. Software development and database activities.
 - vii. Activities related to the acquisition or lease of tangible assets.
 - viii. Innovation management activities.
7. R&D employment includes all persons engaged directly in R&D on a full-time or part-time basis, whether employed by the statistical unit or external contributors fully integrated into the statistical unit's R&D activities, as well as those providing direct services for the R&D activities. Not included in R&D employment and expenditure, are:
- Persons performing less than 0.1 FTE of R&D activity i.e. less than 20 working days in a year; and
 - Persons providing indirect support and ancillary services i.e. maintenance, administrative and security staff.
8. R&D is classified under four main sectors:
- i. *Government (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.
 - ii. *Business Enterprise (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.
 - iii. *Higher Education (HES)* - includes all universities, colleges of technology and other institutions of post-secondary education, whatever their source of finance or legal status.
 - iv. *Private Non-Profit (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 in Malta.
9. Data for the Government and Higher Education sectors is captured through an annual questionnaire that is sent to all the Central Government Ministries and Departments, Extra Budgetary Units, as well as Local Councils. For the Business Enterprise sector, an annual questionnaire is sent to all known active R&D enterprises. The active R&D business population is updated annually through various schemes that enterprises may apply for research grants, reporting R&D in the Innovation survey and other administrative sources.
10. 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: https://nso.gov.mt/en/nso/Sources_and_Methods/Unit_A2/Public_Finance/Documents/Additional-Notes-for-RandD-Questionnaire.pdf
11. All data in this release should be considered as provisional and therefore subject to revision.
12. More information relating to this news release may be accessed at:
- Statistical Concepts: <https://metadata.nso.gov.mt/concepts.aspx>
 Metadata: <http://metadata.nso.gov.mt/reports.aspx?id=3> (GOV and HES)
 Metadata: <http://metadata.nso.gov.mt/reports.aspx?id=26> (BES)

European statistics comparable to data in this News Release are available at:

[EUROSTAT Website/Homepage/Statistics Database](https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&code=sdg-8.1)

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