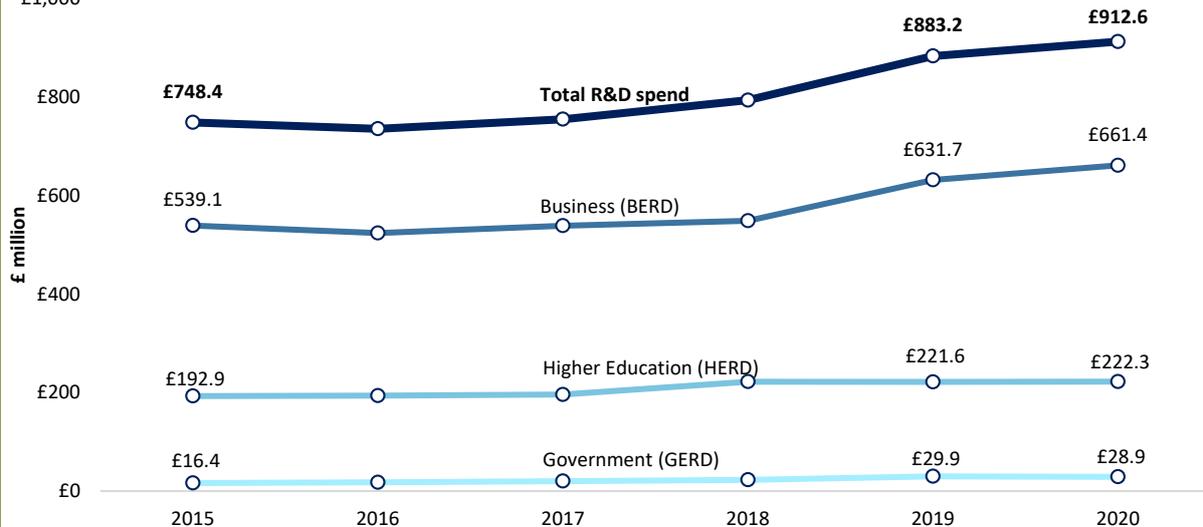


Research and Development Activity in Northern Ireland

Findings from the 2020 Northern Ireland Research and Development Survey

Total R&D spend in 2020 is estimated at £912.6m, representing an annual increase of 3.3%.

Chart 1: Research and Development (R&D) spend in Northern Ireland, 2015-2020 (cash terms, £m)
£1,000



Business R&D spend

£661.4m

**In-house BERD as a %
of total GVA**

1.5%

**5th out
of 12 UK
regions**

**Majority of R&D
work was in-house**

92.8%

Total R&D companies

990

Total R&D Expenditure

- In 2020, £912.6 million (m) was spent on R&D by Businesses, Higher Education and Government in Northern Ireland (3.3% more than in 2019). Of this £912.6m, 72.5% was spent by Businesses, 24.4% by the Higher Education sector and 3.2% by Government departments.

Business Expenditure on R&D – Key Points

- Total business spend on R&D in 2020 was £661.4m, this is an increase of £29.6m (4.7%) since 2019.
- A total of 990 companies engaged in business R&D in 2020. The ten biggest spending companies accounted for one-third of all business R&D spend (£219.5m).
- In-house R&D work accounted for the vast majority (92.8%) of spend in 2020 and the majority of this spend was self-funded (64.3%).
- In-house business R&D spend in Northern Ireland in 2020 expressed as a proportion of GVA (2019) equated to 1.5%, this places Northern Ireland as 5th out of all 12 UK regions. The average across the UK was 1.4%.
- In 2020, there were 8,460 full-time equivalent staff working in R&D roles; 38% worked as researchers, 29% as technicians and 33% were other staff.

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Policy context

This bulletin provides estimates on the level of Research and Development (R&D) activity in Northern Ireland and includes R&D performed by Businesses (BERD), Higher Education Establishments (HERD) and Government Departments (GERD).

R&D is viewed as a key indicator of innovation in an economy. The [Draft Industrial Strategy for Northern Ireland](#) is based around five pillars for growth, one of which is ‘Accelerating Innovation and Research’, and total spend on R&D is one of the indicators upon which success in this area will be measured.

Progress towards some of the long-term goals and medium-term targets of the [Northern Ireland Innovation Strategy](#) is also measured using data contained in this statistical release.

National Statistics



The United Kingdom Statistics Authority has designated these statistics as National Statistics following a full [assessment](#) in June 2012. The assessment was undertaken for [Statistics on Business and Trade in Northern Ireland](#) in accordance with the Statistics and Registration Service Act 2007 and signifying compliance with the [Code of Practice for Official Statistics](#).

National Statistics status means that official statistics meet the highest standards of trustworthiness, quality and public value.

All official statistics should comply with all aspects of the [Code of Practice for Official Statistics](#). They are awarded National Statistics status following an assessment by the Authority's regulatory arm. The Authority considers whether the statistics meet the highest standards of Code compliance, including the value they add to public decisions and debate.

It is NISRA's responsibility to maintain compliance with the standards expected of National Statistics. If we become concerned about whether these statistics are still meeting the appropriate standards, we will discuss any concerns with the Authority promptly. National Statistics status can be removed at any point when the highest standards are not maintained, and reinstated when standards are restored.

Since the assessment by the UK Statistics Authority, we have continued to comply with the Code of Practice for Statistics, and have made the following improvements:

- Redesigned the Research and Development report, providing more information on the importance of the statistics by setting recent changes within context of longer term trends;
- Provided clear information on the size of revisions made to all three types of measured research and development (Business, Higher Education and Government);
- Provided clear information on the sampling method and the size of imputations;
- Improved the presentation of R&D findings to include more easily accessible formats including increased infographics and graphical presentation;

Introduction

Research and Development Explained

R&D is broadly characterised by investigation or experimentation, the intended outcome of which is new knowledge including knowledge of culture and society (with or without a specific practical application), enhanced materials, products, devices, processes or services. R&D covers three types of activity:

- 1. Basic research** – Work undertaken to acquire new knowledge without a specific application in mind;
- 2. Applied research** – Work undertaken to acquire new knowledge with a specific application in mind;
- 3. Experimental development** – Work using the results from basic and/or applied research for the purpose of creating new or improved products / processes.

Northern Ireland's R&D activity is measured by the amount of money spent performing R&D by an organisation, either in-house or purchased from another source, and must involve elements of the five criteria below:

- 1. Novel** - To be aimed at new findings;
- 2. Creative** – To be based on original, not obvious, concepts and hypotheses;
- 3. Uncertain** – To be uncertain about the final outcome;
- 4. Systematic** – To be planned and budgeted;
- 5. Transferable/reproducible** – To lead to results that could possibly be reproduced.

Data collection

Business expenditure on R&D (BERD) constitutes the largest component of total R&D activity and the data to inform this component are collected in the [NI Research & Development Survey](#) administered by NISRA Economic & Labour Market Statistics Branch. The questionnaire used follows the same structure and includes the same questions as that used by [ONS](#) to collect R&D data from GB businesses.

The data contained in this report covers R&D activity carried out in Northern Ireland in the year ending 31st December 2020¹ and all figures quoted are in current prices unless otherwise stated.

Results in this bulletin are provisional and may be subject to revision to take account of any additional information received subsequent to publication. Throughout, totals may not sum due to rounding (to 1 d.p.).

We welcome feedback to help us improve and add value to these statistics.

Contact Aaron.Maguire@nisra.gov.uk.

¹ Companies were given the option of supplying data for a business year ending on any date between 6th April 2020 and 5th April 2021.

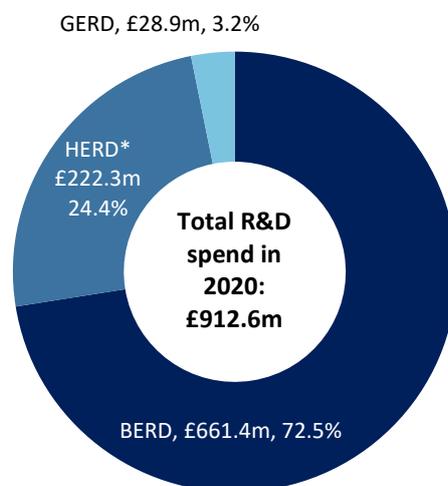
Overall R&D spend in Northern Ireland

Cash Terms

In 2020, the total expenditure on R&D in Northern Ireland in cash terms was £912.6 million (m). The majority of this, (72.5%) was carried out by Businesses (BERD), while 24.4% was undertaken by Higher Education establishments (HERD) and 3.2% by Government departments (GERD).

There was an increase of £29.4m in total R&D expenditure between 2019 and 2020. This overall increase was primarily driven by an increase of £29.6m in Business spend. Higher Education spend increased by £0.7m since 2019, and Government spend decreased by £1.0m.

Chart 2: NI R&D spend in cash terms, 2020



Real Terms

Total R&D spend decreased by 2.6% in real terms between 2019 and 2020. Business, Higher Education and Government expenditure on R&D all decreased over the year by 1.3%, 5.4% and 8.9% respectively.

Compared with 2015, there has been a 6.5% increase in total R&D spending in real terms (Business: +7.1%, Higher Education: +0.6%, Government: +54.1%) ([Tables 1 and 2](#)).

Chart 3: Northern Ireland R&D spend in real terms**, 2015-2020



*To avoid double counting, HERD spend in Charts 2 and 3 excludes £1.1m in 2020 and £0.9m in 2019 that was carried out by businesses.

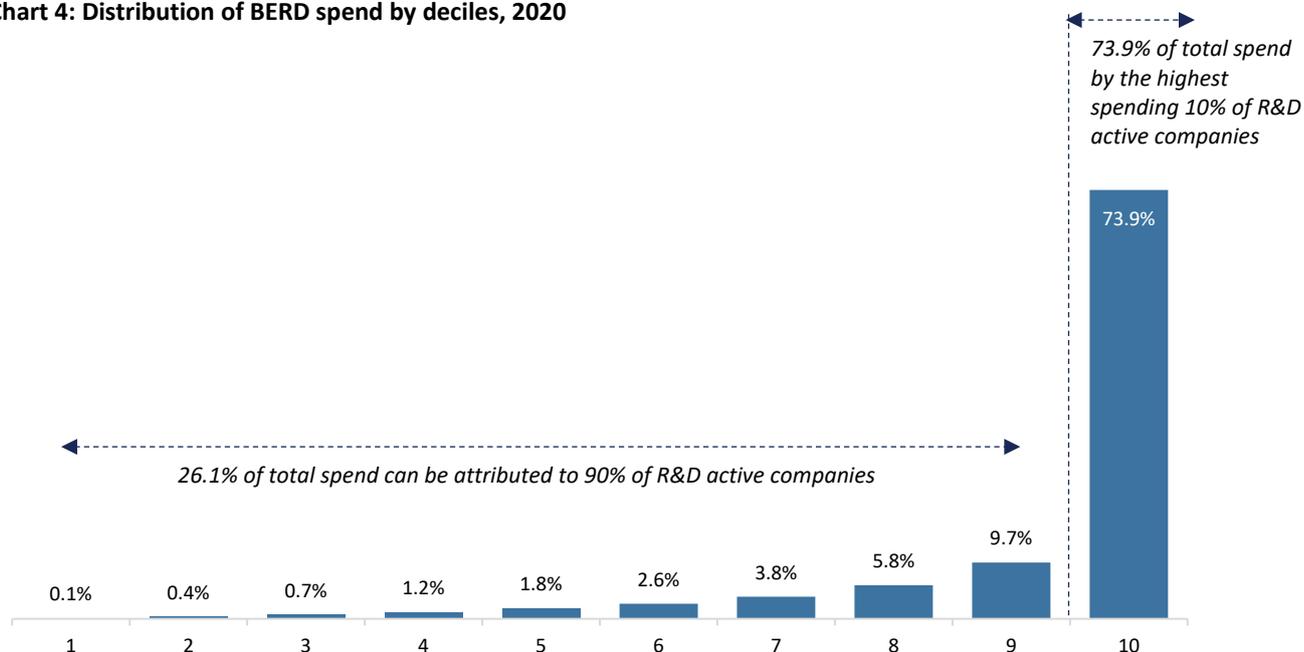
**GDP deflator used to convert cash terms to real terms: 2015 (87.302), 2016 (88.958), 2017 (90.577), 2018 (92.388), 2019 (94.251), 2020 = 100.

Source: [ONS deflators at market prices, September 2021 \(Quarterly National Accounts\)](#)

Business R&D activity in Northern Ireland

Almost three quarters of business spend (73.9%) was by the highest spending 10% of R&D companies. Median spend on R&D per company was £145,000, however as is presented in this bulletin, spend varies due to a range of factors, e.g. nature of the business (industrial sector) or company size.

Chart 4: Distribution of BERD spend by deciles, 2020



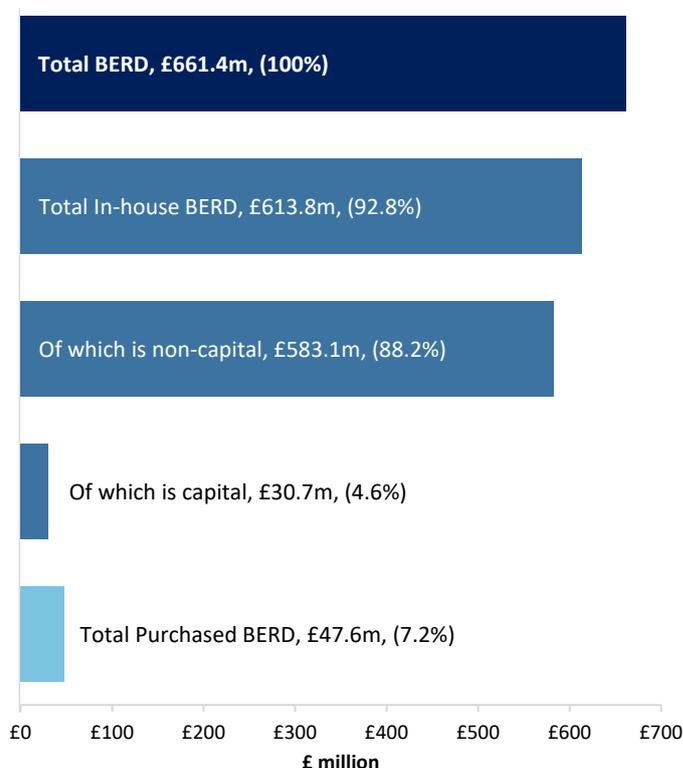
BERD consists of two broad components; in-house and purchased R&D. In-house expenditure accounted for 92.8% (£613.8m) of total BERD spend in 2020 and purchased BERD for the remaining 7.2% (£47.6m).

The two components of in-house R&D expenditure are non-capital and capital expenditure.

Non-capital expenditure, including spend on salaries and wages, materials, supplies and services accounted for 88.2% of total BERD and 95.0% of in-house BERD.

Capital expenditure including spend on land, buildings, equipment and machinery accounted for 4.6% of total BERD and 5.0% of in-house BERD ([Tables 4 and 5](#)).

Chart 5: Breakdown of total BERD expenditure, 2020

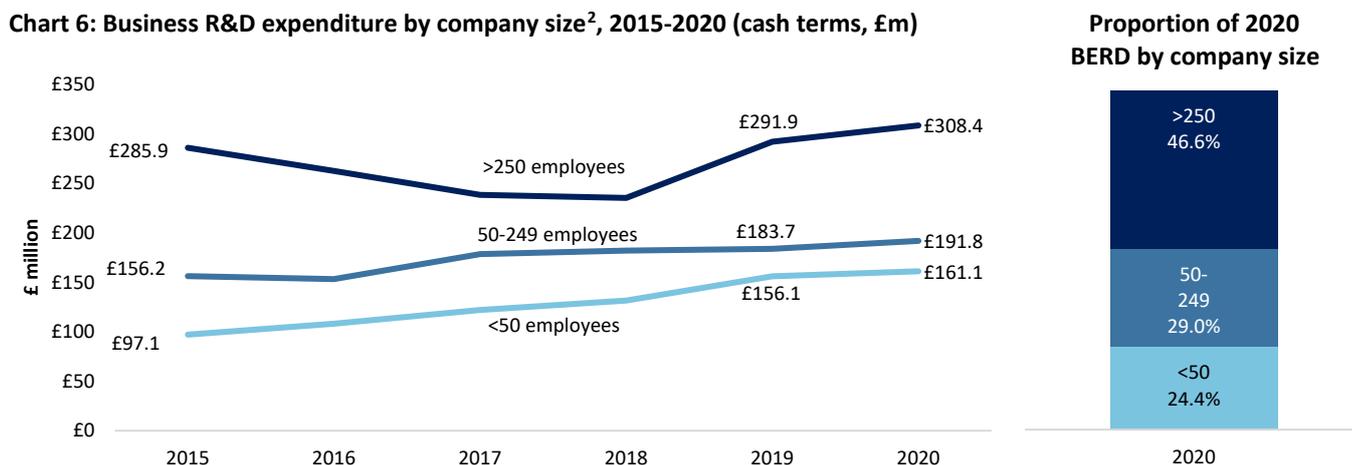


Business R&D - Company size

Large companies (with 250 or more employees) accounted for 46.6% of BERD in 2020, although they represented only 6.9% of all R&D performing companies. Small firms (those with less than 50 employees) accounted for 24.4% of BERD and represented 71.3% of R&D performing companies in 2020.

Chart 6 below shows that the amount of expenditure increased in cash terms for each category of company size between 2019 and 2020 (<50 employees, +£5.0m; 50-249 employees, +£8.1m; 250+ employees, +£16.5m). (Tables 6 to 8).

Chart 6: Business R&D expenditure by company size², 2015-2020 (cash terms, £m)



*The European Commission definition of Small Medium Enterprises (SME) used is defined as being enterprises with less than 250 employees and large companies as being enterprises with more than 250 employees.

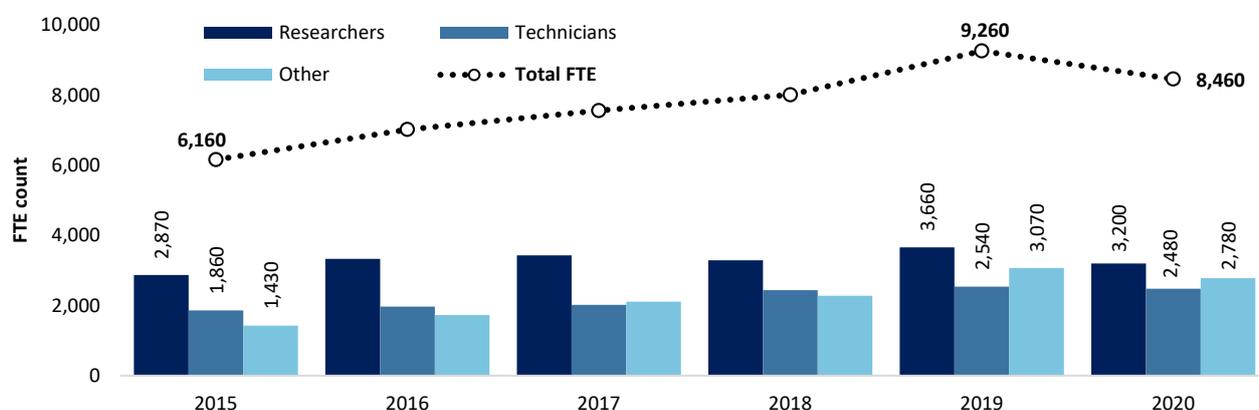
Business R&D – Employment

The total number of R&D full-time equivalent staff (FTE) decreased over the year. There were 8,460 FTE working in an R&D role in 2020, 9% lower than in 2019 (9,260 FTE) and 37% higher than 2015 (6,160 FTE). Overall, spend on salaries per R&D FTE was £45,800 in 2020.

Those working in a research role (PhD students, graduates and scientists) accounted for 38% of FTE in 2020, technicians (those who perform scientific and technical tasks under the supervision of researcher) accounted for 29% and 33% were “other” staff (support, secretarial and clerical staff involved in R&D).

Companies reported a total R&D employee headcount of 11,880 employees in 2020, which equates to 12% of all employees in these companies. Approximately three-quarters of all R&D staff were male. (Tables 13 to 16).

Chart 7: Business R&D FTE employment in NI, 2015-2020

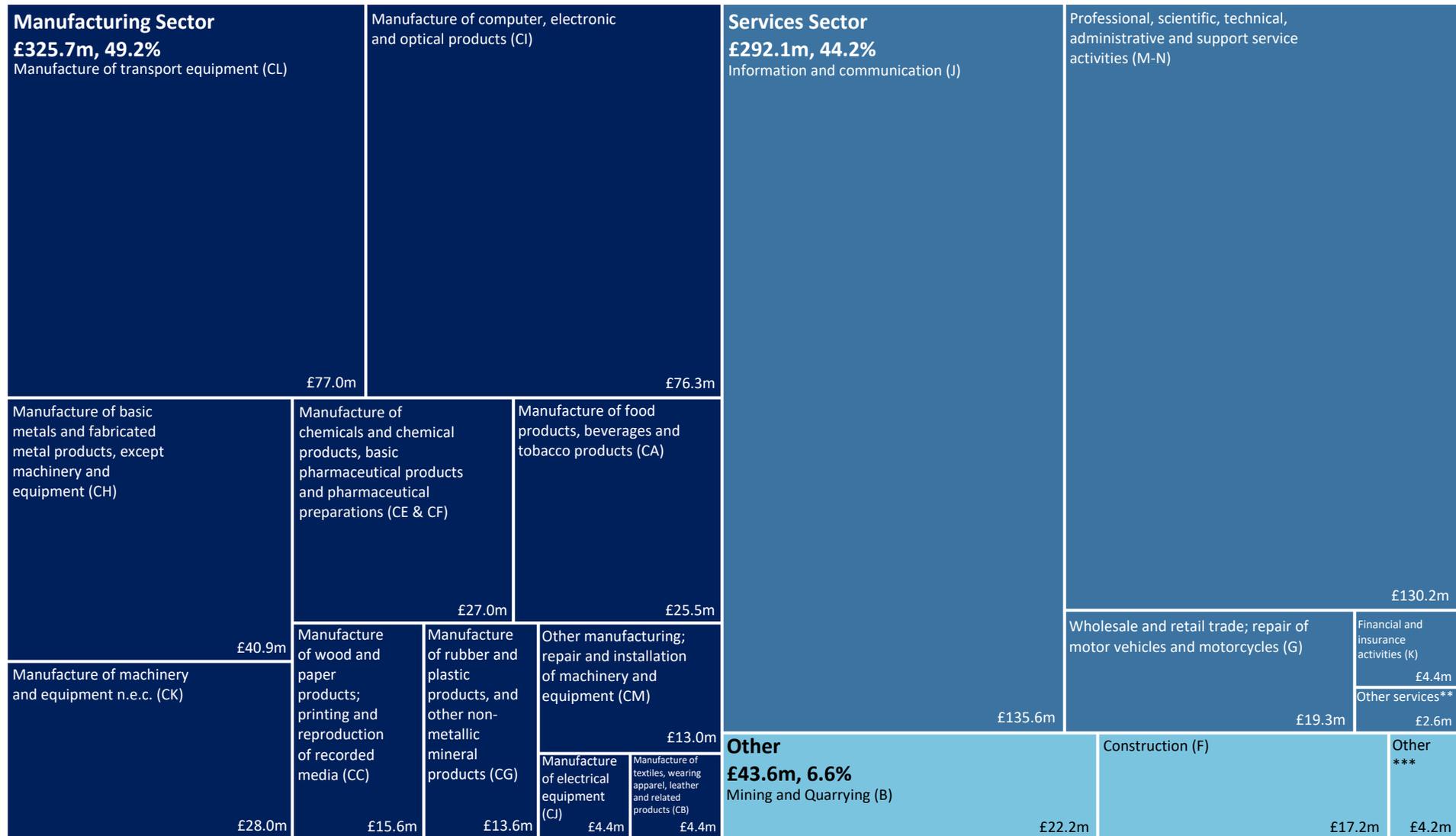


Estimates of employment in R&D are best produced on a full-time equivalent (FTE) basis where businesses convert employee hours working on R&D into FTE figures, providing a better indication of total labour input than a simple headcount.

² Company size based on persons on payroll

Business R&D – Sectoral breakdown

Chart 8: Breakdown of total BERD spend by sector (SIC 2007 classification*), 2020 (£millions)



*The sectoral analyses are based on the Standard Industrial Classification 2007 (or SIC 2007) of industries. Data prior to 2009 are on a SIC 2003 basis. Care should therefore be taken when making comparisons with previous reports. More details on SIC 2007 are available via ONS online.

**Other service sectors include: H, Transportation and storage; O-Q, Public administration and defence, education, human health and social work activities; R-U, Other service activities.

***Other sectors include: A, Agriculture, forestry and fishing; D, Electricity, gas, steam and air conditioning supply; E, Water supply, sewerage, waste management and remediation.

Around half of all business expenditure on R&D can be attributed to the manufacturing sector (£325.7m, 49.2%). Manufacturing of transport equipment (SIC Classification: CL) remained the largest manufacturing sub-sector and accounted for just under one-quarter of all manufacturing spend in 2020 (£77.0m). Over half of R&D spending in the manufacturing sector was accounted for by companies involved in Engineering & Allied Industries (CI, CJ, CK, and CL combined).

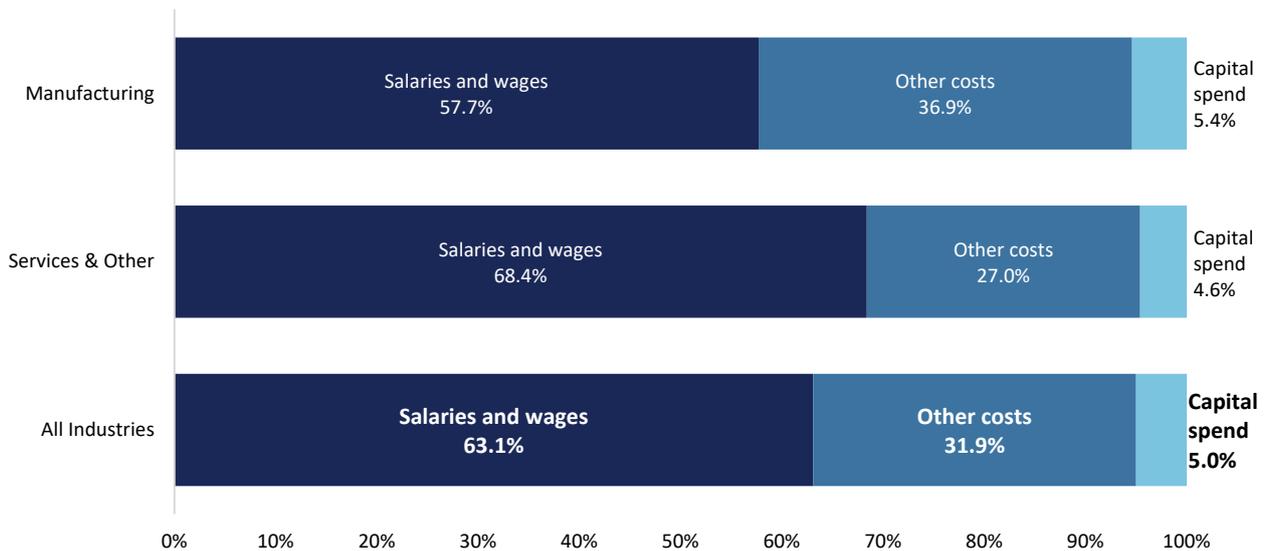
Businesses in the information and communication sector accounted for almost half (46.4%, £135.6m) of service sector R&D spend in 2020. At £130.2m, businesses in the 'Professional, scientific, technical, administrative and support service activities' sector accounted for 44.6% of service sector R&D spend.

In-house spend accounted for the majority of R&D spend in both sectors. At 68.4%, salaries & wages constituted a larger proportion of in-house spend in the services & other sector in comparison to the manufacturing sector (57.7%) ([Tables 9 to 12](#)).

Table 1: In-house and Purchased R&D Expenditure by Sectors, 2020

Sector	In-house		Purchased		Total BERD	
	£millions	% of BERD	£millions	% of BERD	£millions	% of BERD
Manufacturing	305.8	46.2%	19.8	3.0%	325.7	49.2%
Services & Other	308.0	46.6%	27.7	4.2%	335.7	50.8%
All Industries	613.8	92.8%	47.6	7.2%	661.4	100%

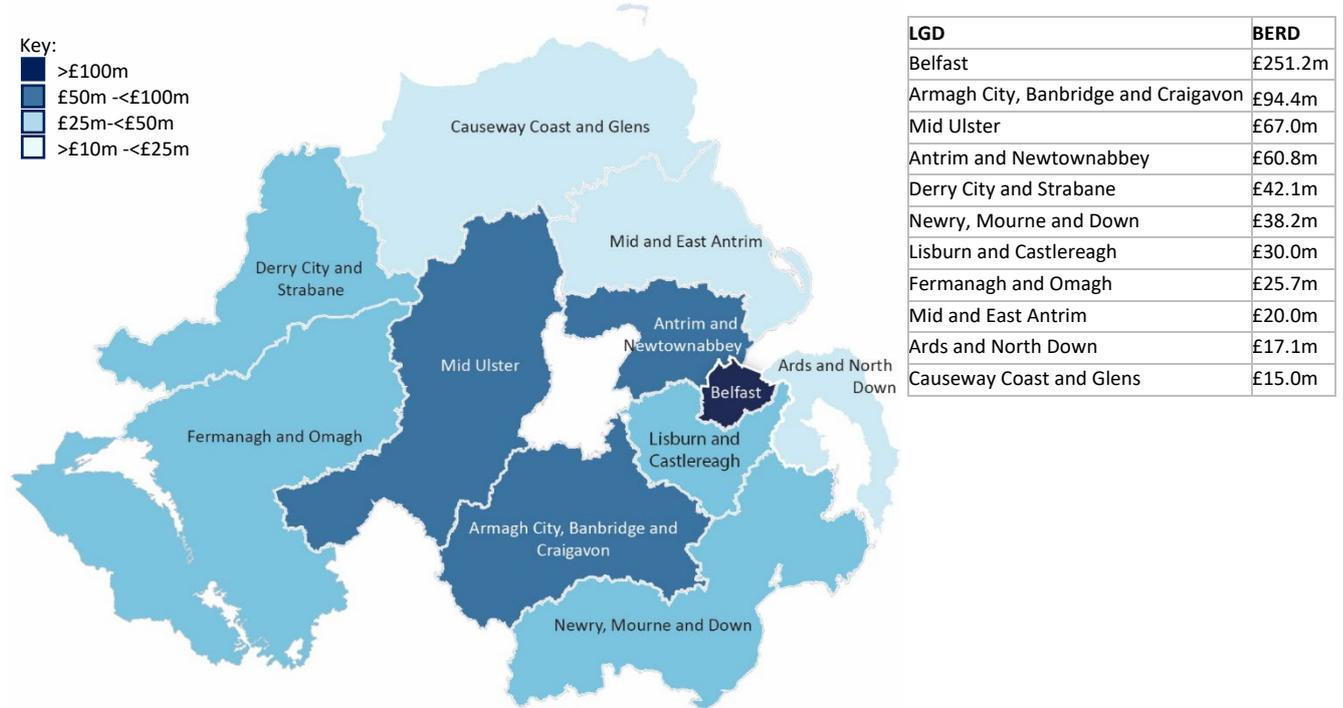
Chart 9: Breakdown of in-house R&D expenditure by sector, 2020



Business R&D – Local Government District

Approaching two-fifths (38.0%, £251.2m) of total BERD was attributed to companies in the Belfast LGD in 2020. At £94.4m, companies in Armagh, Banbridge & Craigavon LGD accounted for 14.3% of total BERD in 2020.

Chart 10: Business R&D spend by Local Government District (LGD), 2020



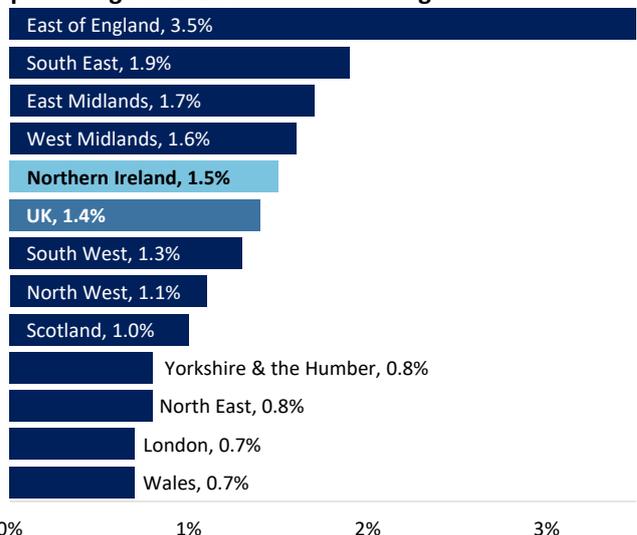
Business R&D – UK Regional Comparisons

Total business expenditure on R&D as a percentage of GVA is one of the medium term targets for measuring progress in the [Northern Ireland Innovation Strategy](#). In 2020, **total** business expenditure on R&D (£661.4m) equated to 1.6% of GVA*. In its UK [bulletin](#), the Office for National Statistics (ONS) presents business R&D as a proportion of GVA in terms of in-house expenditure. For comparison, at 1.5%, **in-house** R&D expenditure in Northern Ireland as a proportion of 2019 GVA** is just above the UK average (1.4%) and ranks 5th out of the 12 UK regions. ([Tables 17 to 20](#)).

Table 2: In-house spend by UK region, 2020

Spend Bracket	UK Region	In-house Spend
>£3,000m	1. East of England	£5,848m
	2. South East	£5,497m
	3. London	£3,380m
£2,000m>£2,999m	4. West Midlands	£2,258m
	5. North West	£2,035m
£1,000m>£1,999m	6. East Midlands	£1,952m
	7. South West	£1,910m
	8. Scotland	£1,437m
	9. Yorkshire & the Humber	£1,070m
£500m>£999m	10. Northern Ireland	£614m
<£500m	11. Wales	£494m
	12. North East	£444m

Chart 11: In-house R&D expenditure (2020) as a percentage of 2019 GVA for all UK regions



*2020 GVA figures are not yet available (release TBA). UK Business Expenditure on Research and Development (BERD) results were released on 19th November 2021 and can be found at the following link: <https://www.ons.gov.uk/economy/researchanddevelopmentexpenditure>
 **2019 GVA figures can be accessed via the following link: <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets>

Business R&D – Ownership

The majority of the 990 companies engaged in R&D were locally owned (843, 85.2%) and they accounted for 49.3% (£326.2m) of total R&D spend in 2020. Expenditure by locally owned companies increased by 9.7% (£28.7m) in cash terms between 2019 and 2020.

While externally owned companies accounted for 14.8% of all R&D performing companies, they accounted for just over half (50.7%, £335.1m) of all R&D expenditure in 2020.

Median spend on R&D was £125,000 per locally owned company in 2020, compared with £511,000 per externally owned company. Median spend was higher among small (0-49 employees), medium (50-249 employees) and large (250+ employees) externally owned businesses, compared with locally owned businesses.

Around four-fifths of R&D spend by companies with less than 50 employees was by locally owned firms. Locally owned companies also accounted for almost three-fifths of R&D spend among companies with 50 to 249 employees. 71.9% of R&D spend in companies with more than 250 employees was attributed to externally owned companies.

Chart 12: R&D by ownership of company, 2020

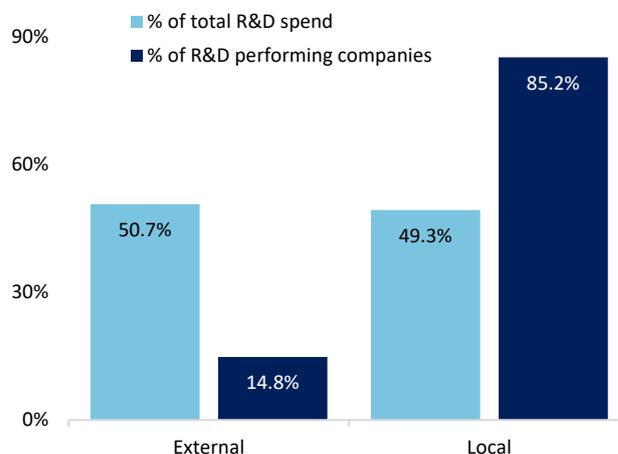


Table 3: Percentage of total R&D spend and median spend per business, by ownership and size, 2020

Ownership by company size	<50			50-249			250+		
	£m	%	Median spend per business	£m	%	Median spend per business	£m	%	Median spend per business
Externally owned	£33.4	20.7%	£198,500	£79.9	41.6%	£869,000	£221.9	71.9%	£1,018,500
Locally owned	£127.7	79.3%	£91,000	£112.0	58.4%	£341,000	£86.6	28.1%	£619,500
Overall	£161.1	100%	£93,500	£191.8	100%	£364,500	£308.4	100%	£744,000

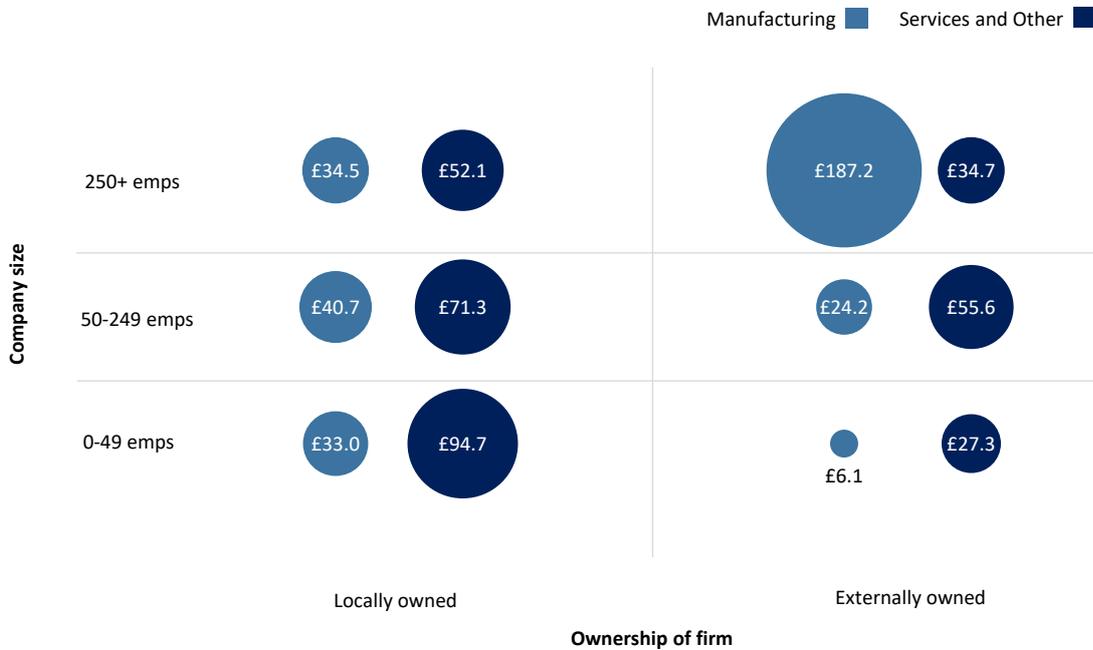
Externally owned companies accounted for around two-thirds (66.8%) of R&D spend in the manufacturing sector in 2020. In contrast, a similar proportion (65.0%) of R&D spend in the services and other sector can be attributed to locally owned companies ([Tables 22-26](#)).

Table 4: Percentage of total R&D spend and median spend per business, by ownership and sector, 2020

Ownership by sector	Manufacturing			Services & Other		
	£m	%	Median spend per business	£m	%	Median spend per business
Externally owned	£217.5	66.8%	£518,000	£117.6	35.0%	£499,000
Locally owned	£108.2	33.2%	£113,000	£218.0	65.0%	£133,000
Overall	£325.7	100%	£141,000	£335.7	100%	£148,000

Chart 13 below shows distribution of total spend by sector, company size and ownership of firm. Large, externally owned manufacturing companies accounted for more than a quarter of total R&D spend in 2020 (£187.2m, 28.3%). The median spend among the 30 companies in this category was £922,500. Total R&D spend was next highest among small, locally owned services and other companies (14.3%, £94.7m). The median spend among the 394 companies in this category was £101,000.

Chart 13: Total R&D spend (£millions) by sector, company size and ownership of firm, 2020

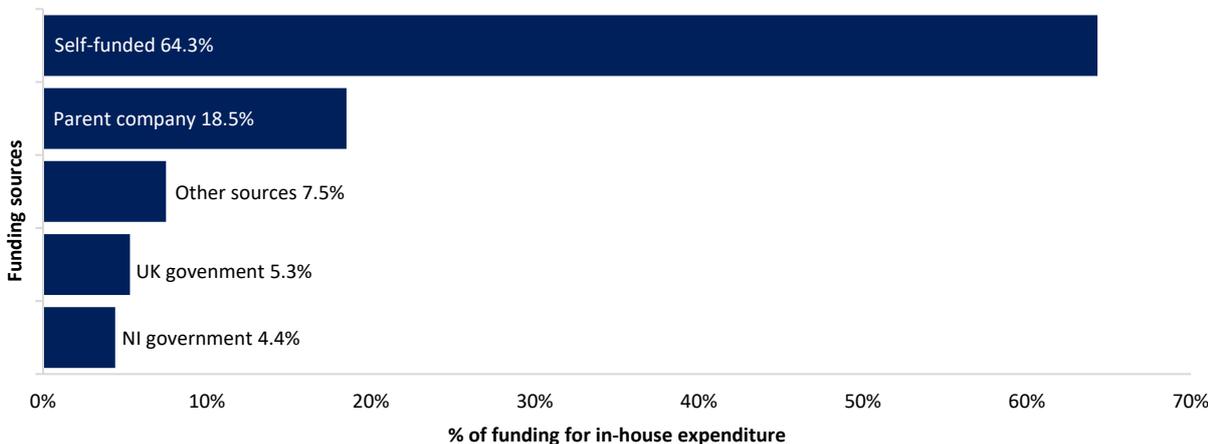


Business R&D - Funding

The funding of in-house R&D expenditure comes from a number of sources: the companies’ own funds, NI government departments including Invest NI, other UK Government bodies, overseas funding (e.g. EU), higher education establishments and other organisations.

The majority of funding for in-house R&D in 2020 was self-funded by the companies carrying out the R&D work (64.3%). Just under one-fifth of funding came from a parent company (18.5%), while NI and UK government sources each contributed 4.4% and 5.3% respectively to in-house funding ([Table 21](#)).

Chart 14: Percentage share of funding sources for in-house expenditure, 2020

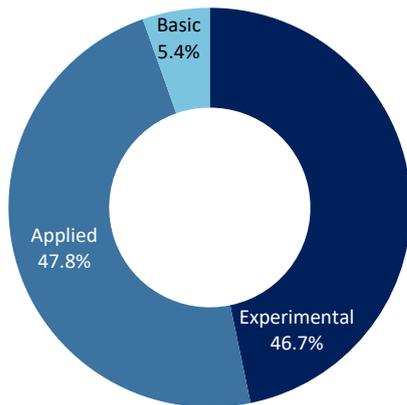


Business R&D – Type of Research

Non-capital expenditure can be analysed in terms of the nature of the research carried out.

1. **Basic research** – Work undertaken to acquire new knowledge without a specific application in mind;
2. **Applied research** – Work undertaken to acquire new knowledge with a specific application in mind;
3. **Experimental development** – Work using the results from basic and/or applied research for the purpose of creating new or improved products / processes.

Chart 15: Share of non-capital spend by research type, 2020



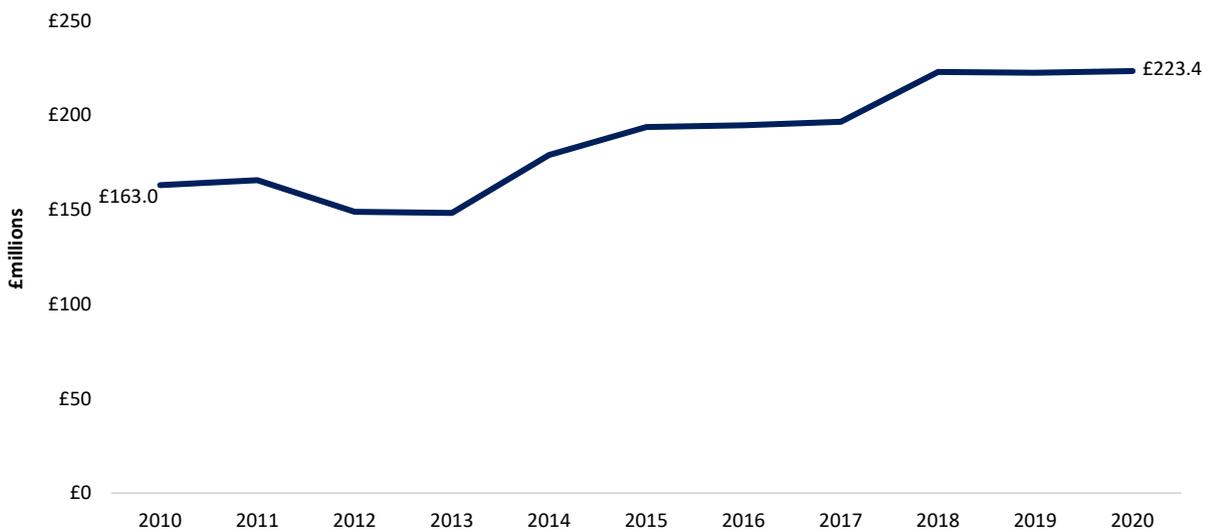
‘Applied’ research accounted for almost half of non-capital spend in 2020 (47.8%, £278.9m). ‘Experimental’ research also accounted for almost half of non-capital spend in 2020 (46.7%, £272.6m) and ‘Basic’ research accounted for the remaining 5.4% (£31.6m).

Just over half of non-capital spending on ‘experimental’ research was undertaken by large companies (52.6%, £143.4m). Large companies also accounted for more than two-fifths of ‘applied research’ spending (41.1%, £114.7m) ([Tables 28 to 30](#)).

Higher Education Expenditure on R&D (HERD)

HERD expenditure remained relatively stable over the year at £223.4m³ (up 0.4%, £0.9m from 2019). Block grants remained the largest source of funding for HERD work (47.1% of total HERD funding) ([Tables 31 to 32](#)).

Chart 16: R&D Expenditure among Higher Education Establishments in NI, 2010-2020



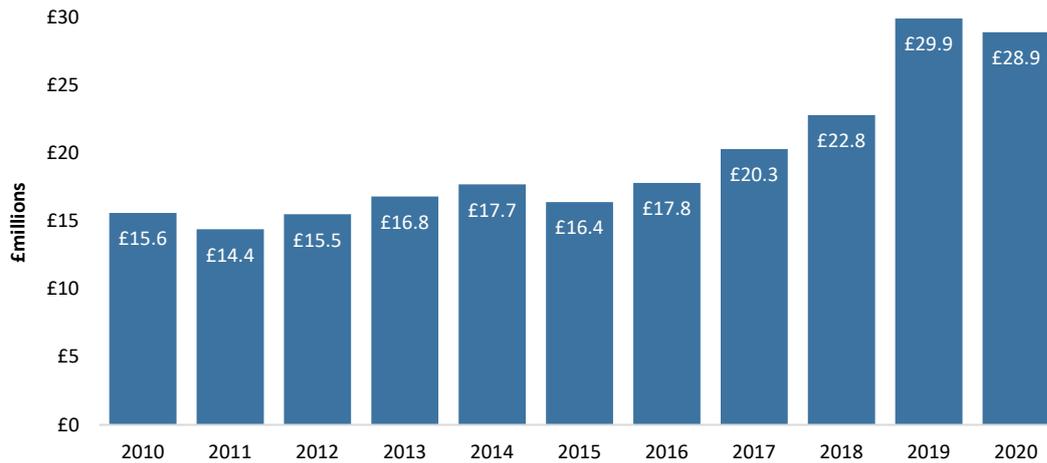
³ Expenditure for 2020 includes £1.1 million of expenditure funded by Northern Ireland Businesses (£0.9m in 2019). Therefore, net HERD in 2020 was £222.3m. All university expenditure on R&D is in-house expenditure i.e. R&D work carried out within the university.

Government Expenditure on R&D (GERD)

The UK Office for National Statistics (ONS) collects data on R&D expenditure within government establishments. Combining these data with BERD and HERD data provides a more complete picture of R&D expenditure in Northern Ireland.

There was a slight decrease in GERD spend in Northern Ireland in 2020, decreasing by £1.0m over the year to £28.9m ([Table 34](#)).

Chart 17: NI Government R&D spend (£m), 2010-2020



Data Tables

Total R&D Spend in Northern Ireland in 2020

[Table 1:](#) BERD, HERD* and GERD R&D Spend by Year in Cash Terms, 2010-2020 (£millions)

[Table 2:](#) BERD, HERD and GERD R&D Spend by Year in Real Terms*, 2010-2020 (£millions)

Business Expenditure on Research and Development (BERD) in 2020

[Table 3:](#) Distribution of total R&D spend by deciles, 2020

[Table 4:](#) Breakdown of Business Expenditure on R&D in Cash Terms, 2019-2020 (£millions)

[Table 5:](#) Five Year Comparison of Business Expenditure on R&D, 2015-2020 (£millions)

[Table 6:](#) Total BERD spend among small, medium and large companies*, 2015-2020 (£millions, persons on payroll)

[Table 7:](#) Percentage of total BERD spend by small, medium and large companies, 2015-2020 (persons on payroll)

[Table 8:](#) Small, medium and large business counts, 2020 (persons on payroll)

[Table 9:](#) BERD spend by manufacturing, services and other subsections**, 2019-2020 (£millions)

[Table 10:](#) Percentage of manufacturing expenditure by SIC 2007 subsections, 2020 (£millions)

[Table 11:](#) In-house and purchased R&D expenditure by main sectors, 2020 (£millions)

[Table 12:](#) Breakdown of in-house R&D spend by sectors, 2019-2020 (£millions)

[Table 13:](#) R&D full-time equivalent (FTE) employment*, 2010-2020 (rounded to the nearest 10)

[Table 14:](#) R&D employment type by gender, 2020 (total headcount to the nearest 10)

[Table 15:](#) Salaries per-FTE by company size (persons on payroll), 2019-2020 (per annum)

[Table 16:](#) R&D employee headcount, 2010-2020 (rounded to the nearest 10)

[Table 17:](#) In-house expenditure of UK businesses by country or region, 2019-2020 (£millions)

[Table 18:](#) Total R&D spend by Local Government District, 2020 (£millions)

[Table 19:](#) Total R&D expenditure by NI businesses as a proportion of GVA, 2015-2020

[Table 20:](#) In-house R&D expenditure by UK businesses as a proportion of the previous year's GVA (£millions), 2020

[Table 21:](#) Proportion of in-house BERD funding by source and company size, 2019-2020 (persons on payroll, £millions)

[Table 22:](#) Total R&D expenditure by ownership of company, 2019-2020 (£millions)

[Table 23:](#) Number of R&D performing companies, 2015-2020

[Table 24:](#) Percentage of R&D spend by ownership of business and sector, 2019-2020

[Table 25:](#) Percentage of R&D spend by ownership of business and company size, 2019-2020 (persons on payroll)

[Table 26:](#) Median company spend on R&D by sector/company size and ownership (£000's), 2020

[Table 27:](#) Total R&D spend (£millions) by sector, company size and ownership, 2020

[Table 28:](#) Type of research by sector and as percentage of all research, 2019-2020 (non-capital expenditure, percentages)

[Table 29:](#) Type of research by company size, 2020 (persons on payroll, percentage of non-capital expenditure)

[Table 30:](#) Type of research as a share of R&D non-capital spend (£millions), 2020

Higher Education Spend on Research and Development (HERD) in 2020

[Table 31:](#) HERD data, 2010-2020* (£millions)

[Table 32:](#) HERD spend breakdowns, 2018-2020 (£millions)

[Table 33:](#) Count of businesses completing joint ventures, 2019-2020

Government Expenditure on Research and Development (GERD) in 2020

[Table 34](#): GERD spend by year, 2010-2020 (£millions)

Deciles and Revision information

[Table 35](#): Deciles of estimates as a percentage of 2020 BERD data

[Table 36](#): Size of revisions to previously published data, 2019 (£millions)

Annexes

[Annex 1, Part 1](#): Business expenditure on R&D 2015-2020 (cash terms and real terms, £millions)

[Annex 1, Part 2](#): Percentage of business expenditure on R&D 2015-2020 (cash terms)

[Annex 2](#): In-house R&D expenditure by sector and employment size band, 2020 (persons on payroll, £millions)

[Annex 3](#): Purchased R&D expenditure by sector and employment size band, 2020 (persons on payroll, £millions)

[Annex 4](#): R&D expenditure by company size 2006-2020 (persons on payroll, £millions)

[Annex 5](#): R&D employment by gender, (total headcount and full-time equivalents (FTE)), 2020 (rounded to the nearest 10)

Background and Methodology

The NI BERD 2020 survey was undertaken by the Northern Ireland Statistics and Research Agency (NISRA). The sample and survey results only cover business enterprises as defined in the “Frascati” manual (<http://www.oecd.org/sti/inno/Frascati-Manual.htm>). This excludes government organisations, higher education establishments and charities.

The definition of R&D adopted for the purposes of the NI inquiry is the same as that used by ONS for the equivalent GB survey:

"The guiding line to distinguish between research and technological development activity (R&D) from non-research activity is the presence or absence of an appreciable element of novelty or innovation. If the activity departs from routine and breaks new ground it should be included; if it follows an established pattern it should be excluded".

The NI questionnaire follows the same structure and includes the same questions as the GB questionnaire, although there were some modifications to tailor the questions asked for use in NI.

The survey covers expenditure in the year ending 31st December 2020, although companies were given the option of supplying data for a business year ending on any date between 6th April 2020 and 5th April 2021.

It is worth noting that variations may occur in NI R&D data from year to year due to the influence of one or two large-scale projects. Spend as it is presented also varies due to a range of factors including company size, ownership of the company and whether it is externally or internally owned, and what sector it falls into.

Survey Design

R&D surveys pose special problems for survey design – R&D takes place in only a small proportion of businesses but a comprehensive list of these businesses does not exist. A simple random sample of the business population would not be suitable for an R&D survey because many of the sample businesses would not undertake R&D and many significant R&D performers would be missed in such a sample.

The solution is to implement a stratified sample design. The stratification variable was the known level of R&D performance of the businesses. This information was gained from previous surveys (mainly the 2019 survey) and extra information from various sources such as the Office for National Statistics (ONS), Invest NI and a filter question on the Annual Business Inquiry. For the purposes of the 2020 survey, businesses were stratified into 4 groups:

- (i) Businesses responding to the 2019 survey who returned or had estimated a total R&D expenditure value greater than zero;
- (ii) Businesses reporting positively to the R&D filter question in the Annual Business Inquiry; other identified potential R&D performers (principally those companies who had received assistance from Invest NI during 2020); and companies newly identified to ONS as R&D spenders;
- (iii) Companies who have been identified as ‘not R&D performers’ when selected for past surveys;
- (iv) The remainder of NI businesses.

The businesses making up strata (i) and (ii) formed a register of R&D performers and the sample for the 2020 survey was derived from this register. Indeed, each of these businesses was issued a questionnaire – in effect, therefore, a census of R&D performers was carried out. Strata (iii) and (iv) were not included as they were assumed to have zero R&D expenditure.

Survey Response Rate

For the 2020 survey, 1,381 forms were sent out to business believed to be performing R&D. Completed forms were returned by 820 businesses representing a response rate of 59.4%. Due to non-response, spend was imputed for 441 companies based on their most recent return.

Impact of COVID-19 on data collection and estimation procedures

Data collection for the 2019 and 2020 surveys occurred during the pandemic, this may have resulted in lower response rates in comparison to pre-COVID-19 surveys.

Efforts were made to reduce the impact of a lower response rate. Namely, larger R&D contributors received more contact than usual to encourage a response and the survey response window was extended. As a result, 70.2% of total R&D spend in 2020 is covered by receipted businesses. In addition, 74.8% of spend among the largest R&D businesses (R&D spend more than £1 million) in 2020 reported in this bulletin is based on receipted returns.

Table 5: Comparison of response rates and spend coverage for 2018, 2019 and 2020 survey periods

	2018	2019	2020
Percentage of sample that returned a form	71.0%	54.9%	59.4%
Spend coverage by receipted businesses	80.5%	78.6%	70.2%

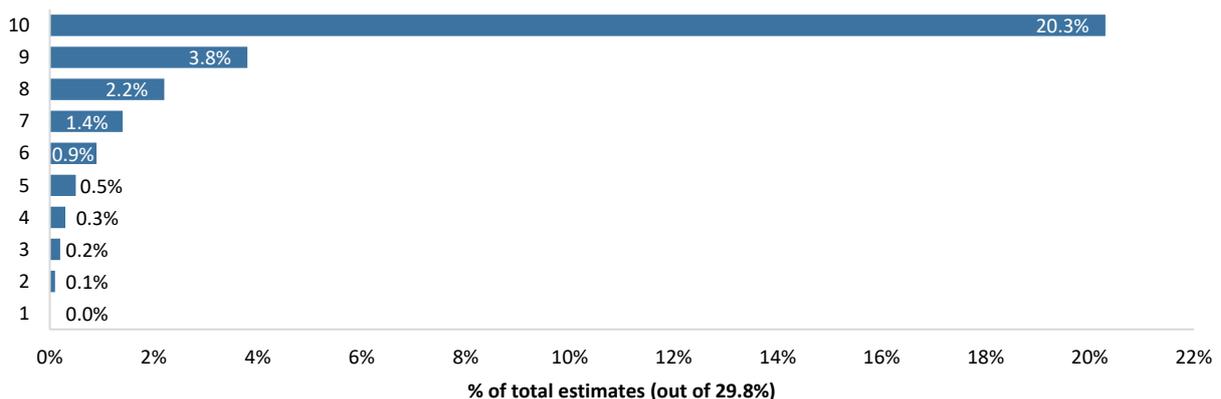
Estimates

Overall, estimates make up 29.8% of total BERD spend for 2020 (compared with 21.4% in 2019). Most of the imputations are calculated using the median change in total R&D spend across the year among responders within a given SIC code, and applying this change to estimate spend for those businesses in the same SIC code that failed to reply to the survey. The remainder were based on historical information and other administrative surveys within NISRA's Economic and Labour Market Statistics Branch. Non-responding companies which reported zero R&D spend the previous year are imputed to have zero spend for the current year.

Estimates for Invest NI companies were based on the value of offers made to promote R&D investment and the contribution of Invest NI's assistance to total planned R&D expenditure. Estimates for Invest NI companies make up 3.9% of the total non-responding company spend. The remaining 96.1% are non-Invest NI estimates.

Chart 18 shows below that, when estimates are ranked according to descending size of spend, the top two deciles (i.e. the top 20% of companies) account for 81.1% of all estimated BERD spend, indicating that most of the estimates were small in magnitude.

Chart 18: Deciles of estimates as a percentage of 2020 BERD data (out of 29.8%)



Revisions

These results are provisional and are subject to revision should additional information become available. As part of this release, business, government and higher education estimates of R&D performance for 2019 have been revised to take account of late returns and misreporting.

Table 6: Size of revisions to previously published 2019 data (£m)

R&D Spend Category	Published	Revised	Difference
BERD Spend	£630.1m	£631.7m	£1.6m
HERD Spend	£221.6m	£221.6m	£0.0m
GERD Spend	£29.7m	£29.9m	£0.2m
Total R&D Spend	£881.4m	£883.2m	£1.8m

Figures contained within all tables in this release may not add due to rounding. All annual changes and percentages detailed in the text have been calculated using raw figures prior to rounding. Percentages calculated on rounded figures may therefore differ from those detailed in the text.

Definition of Terms

Total Expenditure on R&D - This covers expenditure by businesses, expenditure by higher education and other expenditure by government.

Expenditure by Higher Education – NISRA carries out an annual survey of R&D expenditure in Higher Education Establishments in Northern Ireland. The figures shown in Chart 16 provide combined results from the two Northern Ireland universities - i.e. Queen’s University Belfast (QUB) and the Ulster University (UU). The data collected refers to the academic year i.e. 2019/2020 ending 31/7/2020. The universities have made data available for this period on the basis of Transparency Review data collected within each respective institution.

Other Expenditure by Government - The ONS collects annual data on total UK government expenditure on science, engineering and technology (SET). SET expenditure by the UK government includes expenditure by government departments, Research councils and Higher Education Funding Councils (HEFCs). It also includes expenditure on R&D conducted within Government Departments.

By utilising this data in conjunction with the results from the NISRA survey, it has been possible to compile a more complete picture of total expenditure on R&D in NI. The figures described in Charts 2 and 3, expenditure by businesses, higher education and other expenditure by Government complement each other; i.e. there is no double counting.

In-house R&D - This is R&D carried out within the company and was previously referred to as intramural expenditure.

Cash terms - R&D spending without the effects of inflation removed.

Real terms - R&D spending with the effects of inflation removed. Real earnings are calculated by adjusting historical R&D spend using [ONS deflators at market prices, September 2021 \(Quarterly National Accounts\)](#).

The 2020 ONS Report is available at the following link:

[ONS, Business enterprise research and development, UK statistical bulletins \(including 2020\)](#)

Quality reporting

The quality report for the R&D survey and analysis can be found at:

[NISRA, R&D archive publications](#)

This report describes in detail the quality of the statistics presented in this publication (in terms of relevance, accuracy, timeliness and punctuality, accessibility and clarity, coherence and comparability, trade-offs between output quality components, assessment of user needs and perceptions, performance, cost and respondent burden and confidentiality, transparency and security).

Next Publication

Analysis of the 2021 results will be published in December 2022, and will be available at:

[NISRA, Research and Development Homepage](#)

For further information

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