



A Statistics Research Branch Publication

NORTHERN IRELAND RESEARCH & DEVELOPMENT STATISTICS 2002

Published 28/11/2003

This report provides detailed results from the 2002 Northern Ireland Business Research & Development (R&D) Survey reflecting the nature and extent of investment by companies in research activity. Summary results from the Higher Education R&D Survey are also included. Headline data from the surveys show that:

- Total expenditure on Research and Development in Northern Ireland was £272.6 million in 2002, of which £156.6 million (57%) was spent by businesses, £105.8 million (39%) by the Higher Education sector and the remainder was other government expenditure;
- There was a slight fall in real terms (-1.7%) in Northern Ireland business R&D expenditure between 2001 and 2002 (from £159.4m to £156.6m);
- This is compared with 3.3% growth in real terms for the same period in the UK where R&D expenditure was £13,110 million;
- Between 1996 and 2002 business expenditure on R&D in real terms in Northern Ireland increased by some 43% compared to around 22% in the UK as a whole;
- While Northern Ireland R&D expenditure fell slightly, there was an increase in the number of employees working in the area. Some 2,590 whole time equivalent employees were working in R&D in 2002, representing a 4.5% increase in R&D staff compared to 2001;
- In 2002, the manufacturing sector accounted for some £119m (76%) of business R&D expenditure in Northern Ireland, down some 15% on the previous year;
- While some 80% of all businesses carrying out R&D in Northern Ireland were locally owned, they accounted for just over one-third (£54.2 million) of total business R&D;

Northern Ireland Research & Development Statistics 2002

BACKGROUND

This report presents summary data from the 2002 Northern Ireland Business and Higher Education Research & Development Surveys. This is the fifth Business R&D survey carried out by DETI - it was carried out triennially between 1993 and 1999, but is now collected on an annual basis (from 2001 onwards). Results from the second annual Higher Education R&D survey (relating to 2002) are also given. These surveys provide a wide range of information on Research & Development (R&D) activities. The main survey is the business R&D survey, the sample and results of which relate to business enterprises in Northern Ireland (NI). Statistics Research Branch of the Department of Enterprise, Trade & Investment (DETI), carries out the survey.

The business results provide the Northern Ireland element of an annual UK survey carried out by the Office for National Statistics – NI figures are made available at the same time as the UK results are released. Some results for UK and UK regions are also included to aid comparisons. This booklet contains detailed results from the business survey, summary results from the higher education survey and further comprehensive tables relating to business R&D spend in the annexes.

From the information given on survey returns, total expenditure on R&D in Northern Ireland can be derived. It is also possible to disaggregate the data including: expenditure on R&D carried out within or external to the company; sources of R&D funding; type of research and data split by company size and/or sector (e.g. manufacturing, services etc.). The survey also collects information on the number of employees working in R&D.

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Northern Ireland Research & Development Statistics 2002

Executive Summary

DETI Statistics Research Branch

28th November 2003

1. Introduction

This bulletin provides information on the level of Research & Development (R&D) activity in Northern Ireland. R&D activity contributes to the development of new technologies, products and processes and is a key driver of productivity growth. The Northern Ireland R&D surveys cover the business sector, higher education and other government financed activities. It includes information on:

- The level of R&D;
- Sources of funding for R&D;
- Employment in R&D.

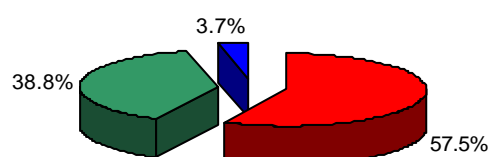
and provides important indicators of the extent to which Northern Ireland companies and higher education establishments are investing in the activities that underlie future economic development.

Sample Design

For the Business R&D Survey the sample is obtained by stratifying companies by the known level of R&D performance using information gained from previous surveys and other sources. All companies believed to be performing R&D are issued a questionnaire - in effect, therefore, a 'census' of R&D performers was carried out. A total of 533 returns were received by the Department – some 90% of those sampled.

2. Total Expenditure on R&D

Total expenditure on Research and Development in Northern Ireland was £272.6 million in 2002, of which £156.6 million (57%) was spent by businesses, £105.8 million (39%) by the Higher Education sector and the remainder was other government expenditure.



■ Business ■ Higher Education ■ Other government

3. Business R&D: Real terms

Between 2001 and 2002 total business expenditure on R&D in Northern Ireland decreased by 1.7% in **real terms** (from £159.4m to £156.6m). This is compared to over 3% growth in real terms for the same period in the UK where R&D expenditure was £13,110 million.

Between 1996 and 2002 business expenditure on R&D in real terms in Northern Ireland increased by some 43% compared to around 22% in the UK as a whole.

4. Business R&D: Intramural Expenditure

Intramural expenditure, i.e. spending carried out within a company in Northern Ireland, accounted for over 95% (£149.3 million) of total expenditure in 2002. Intramural expenditure fell by 3.1% in **real terms** between 2001 and 2002.

5. Business R&D: Sectoral Analysis

In 2002, the majority of R&D was carried out within the manufacturing sector (76%) with the remaining 24% carried out in services and the 'other' industries categories. This shows an increased share of expenditure in the services & other sector compared to previous years (for example, in 2001, manufacturing accounted for 90% and services & other 10%).

Manufacturing expenditure in 2002 (£119m) was down some 15% on 2001.

6. Business R&D: by Company Size

The importance of large companies to R&D activity is reflected in the fact that companies with 500 or more employees accounted for just under half of total business R&D expenditure in 2002 (compared to 66% of total spend in 2001). However, such companies represented only 6% of the total number of firms that performed R&D in 2002.

7. Business R&D: Source of funds

The majority of funding (78%) came from companies' own funds, with 7% from Government, 12% from overseas and 2% from other sources. The proportion of funding from own funds fell from 88% in 2001 to 78% in 2002.

In the UK, some 66% of R&D funding came from own funds, 7% from government and 26% from overseas.

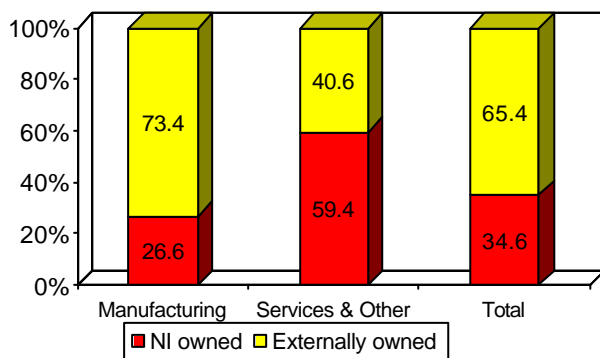
8. Business R&D: Employment

In 2002, companies surveyed reported a total of 2,720 employees working on R&D, some 6.7% of all employees in companies carrying out R&D. [The whole time equivalent figure for the same period was 2,590 or 6.4%].

Approximately 90% of all R&D employees were full-time. Of all R&D employees, 73% were scientists, 15% were technicians and other employees accounted for 12% of such employees.

9. Business R&D: Ownership

Companies with ownership outside NI play an important role in financing R&D activities in the region. Almost two-thirds of total R&D spend was by such foreign owned companies although they accounted for only one-fifth of all R&D-performing companies.



10. Business R&D: Regional Comparisons

Of the 12 UK regions, nine showed a rise in business R&D expenditure in real terms over the period 2001-2002. The percentage fall in Northern Ireland R&D spend (-1.7%) over the

same period was smaller than the decreases in the remaining two UK regions.

Over the period 1996-2002, real terms R&D growth in Northern Ireland (+43%) was the third highest of the 12 UK regions.

11. Higher Education R&D: Summary

R&D expenditure in the Higher Education sector increased by 7% in cash terms between 2001 and 2002 (from £100.3m to £107.4m) reflecting its importance to Northern Ireland. Net expenditure in 2002 (excluding spend by businesses undertaken by higher education) was £105.8m.

The majority of funding (66%) for Higher Education R&D in 2002 came from the Government block grant (£70.7 million). In 2002, there were some 1,730 full-time equivalent employees in the Higher Education sector engaged in R&D, which is similar to the number of employees in 2001.

12. R&D Investment Rate

The most recent information for R&D expenditure as a percentage of Regional Gross Value Added relates to 2001. This shows that Northern Ireland was the seventh highest of the twelve UK regions (lower proportions were recorded in Scotland, London, Yorkshire & Humber, North East and Wales).

However, the proportion for NI in 2001 at 0.79% is just over half the UK average of 1.45%. Northern Ireland businesses would have needed to invest some £120 million more in R&D in 2001 to reach the UK average rate.

13. Other Sources

The 2001 UK Innovation Survey estimated that 46% of all NI businesses had undertaken some form of innovation **activity** over the 3-year sample period (1998-2000) compared to 47% of all firms in the UK. In addition, the survey showed that 32% of enterprises in NI undertook innovation related **expenditure**, slightly below the UK average of 36%.

Further details from this survey are available at www.dti.gov.uk/iese/regional2001b.pdf.

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SECTION 1

TOTAL EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2002

BACKGROUND

Performers and funders of research & development (R&D) are divided into four economic sectors: Business, Higher Education Institutions, Government and the Private Non-Profit sector.

DETI now carry out annual surveys of R&D expenditure in the Business sector and Higher Education Institutions in Northern Ireland. Further detailed results from these surveys are contained in Sections 2 and 3 respectively of this Statistics Bulletin.

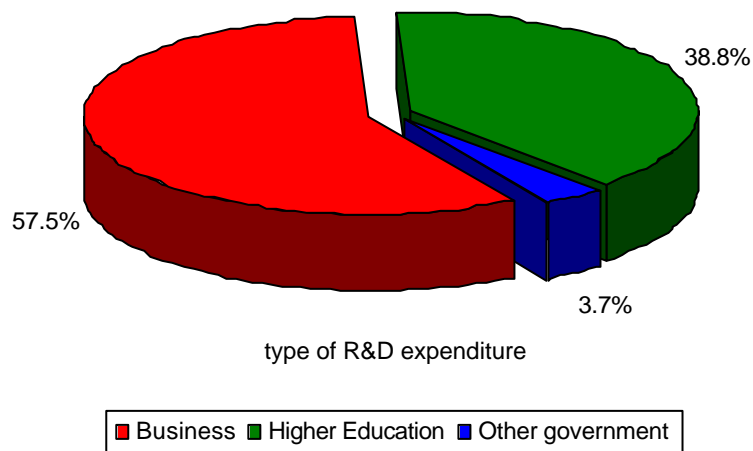
The Office for National Statistics (ONS) also conducts an annual survey of Government R&D, which is addressed to all Government departments, including those in Northern Ireland. The latest detailed results are available on the Office for Science and Technology's website at www.ost.gov.uk/setstats/index.htm.

Details of spend in the Private Non-Profit sector in Northern Ireland are not available. However, previous analysis by ONS shows that only around 1% of total R&D in the UK was carried out within this sector.

Table 1.1: Total Expenditure on R&D¹

	£million
Total expenditure on R&D	272.6
of which:	
Expenditure by businesses	156.6
Expenditure by Higher Education ²	105.8
Other expenditure by Government ³	10.1

**Figure 1.1:
Main Split
of R&D Expenditure**



¹ Figures contained within all tables in this Bulletin may not add due to rounding.

² To avoid double counting, this figure excludes £1.6m of expenditure on R&D by businesses that was undertaken by universities or higher education establishments.

³ 2001/02 Forward Look expenditure by NI Departments (see Notes to Editors, note 5) excluding grants to businesses to conduct R&D and funding to higher education institutions. The figure does not include expenditure by higher education establishments as this is detailed separately.

SECTION 2

BUSINESS EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2002

NORTHERN IRELAND BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT DURING 2002

Table 2.1 below details the headline results from the 2002 Business Expenditure on Research & Development (BERD) survey. The table shows that in 2002, total expenditure (in cash terms) on R&D by Northern Ireland businesses was an estimated £156.6 million.

Total BERD consists of intramural expenditure (i.e. R&D carried out within the company) and extramural expenditure (i.e. R&D funded by firms in Northern Ireland but undertaken by other firms in the UK and abroad). The vast majority of total BERD was intramural expenditure (£149.3m or 95.3%) with £7.3m or 4.7% being extramural expenditure. Of this £7.3m of extramural expenditure in Northern Ireland, some £1.6m was undertaken by the Higher Education sector.

Over 78% of funding for R&D in 2002 came from the companies' own resources (£122.4m) while government provided a further 7.2% (or £11.3m) and the remainder came from overseas (12.3% or £19.2m) and other sources (2.4% or £3.8m).

Table 2.1: Business Expenditure on R&D - 2002

	Total Expenditure by Business (£million)	As % of Total Expenditure
Total Expenditure	156.6	100.0
Intramural Expenditure ⁴	149.3	95.3
of which:		
Current Expenditure	137.6	87.9
Capital Expenditure	11.7	7.5
Extramural Expenditure ⁵	7.3	4.7
of which:		
Undertaken by Higher Education	1.6	1.0
Source of funding:		
Business	122.4	78.1
Government	11.3	7.2
Overseas	19.2	12.3
Other ⁶	3.8	2.4

Total employment on R&D in businesses for 2002 was 2,590 (based on whole time equivalent figures⁷).

^{4, 5, 6 & 7} For definitions see Notes to Editors, note 5

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SOME HISTORICAL COMPARISONS

Prior to 2001, the Research and Development Survey was conducted every three years (in 1993, 1996 and 1999). Since 2001, DETI has undertaken to survey companies annually. Table 2.2 below makes comparisons with earlier DETI surveys. To allow comparability of current with previous results, all figures relate to Total Business Expenditure - i.e. civil and defence expenditure by business on R&D (including grants given by government). Higher Education spending and other direct expenditure by Government are excluded.

Table 2.2: 2002 Results Compared with 2001, 1999 and 1996 (figures in millions)

	Cash Terms				Real Terms (2002 prices) ⁸				% Change Real Terms	
	2002	2001	1999	1996	2002	2001	1999	1996	01-02	96-02
Total Expenditure	156.6	155.0	102.7	94.7	156.6	159.4	110.2	109.6	-1.7	42.9
Intramural	149.3	149.9	97.2	89.9	149.3	154.2	104.3	104.1	-3.1	43.4
Extramural	7.3	5.1	5.5	4.8	7.3	5.2	5.9	5.6	39.9	30.4
Funded by Government	11.3	8.6	10.6	17.4	11.3	8.9	11.4	20.1	27.0	-43.8
Funded from own funds	122.4	137.1	89.4	72.5	122.4	141.0	95.9	83.9	-13.2	45.9
Other	23.0	9.3	2.7	4.8	23.0	9.6	2.9	5.6	140.6	310.7

Key Findings

Between 2001 and 2002 total business expenditure on R&D decreased by 1.7% in **real** terms with intramural expenditure falling by 3.1%. In addition, government funding increased by 27% over the year whilst businesses own expenditure decreased by 13.2%.

The ten biggest R&D spenders in 2002 accounted for 60% of total R&D expenditure – this is compared with 69% in 2001, 59% in 1999 and 57% in 1996. Five companies have appeared in the top ten in each of the five DETI surveys (i.e. 1993, 1996, 1999, 2001 and 2002) with two further companies appearing in the top ten four times out of the five surveys.

In cash terms:

In 2002, twenty-five companies spent more than £1 million on R&D (compared with nineteen companies in 2001, twenty companies in 1999, sixteen in 1996 and nine in 1993).

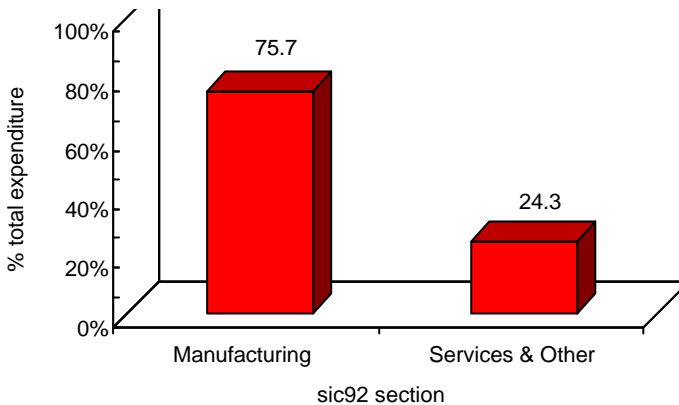
Average expenditure was £60,400 per R&D employee in 2002, 3.4% lower than the figure for 2001 (employees are on a whole time equivalent basis).

In 2002, 2590 employees (on a whole time equivalent basis) were engaged in R&D work – 6.4% of all employees of companies involved in R&D. Comparable figures for 2001 were 2,480 employees or 5.5 % of all employees of R&D companies (1999: 4.8% and 1996: just under 4%).

⁸ GDP deflator used to convert cash terms to real terms: 86.4 (1996), 93.2 (1999) and 97.2 (2001) where 2002=100.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SECTORAL BREAKDOWNS

Figure 2.1: Total R&D Expenditure in 2002 by Sector (SIC 2003 basis)



In 2002, the majority of R&D was carried out within the manufacturing sector (75.7%) with the remaining 24.3% carried out in services and 'other' industries category. This shows an increase in spend in the services & other sector compared to previous years (for example, in 2001 manufacturing accounted for 90% and services & other 10%).

The Electrical and Optical Equipment division (DL) accounted for approximately half (46.2%) of all manufacturing R&D (see Figure 2.3) with the Machinery & Equipment division (DK) accounting for over 20% and Chemicals (DG) a further 12%.

Figure 2.3 highlights that just over 70% of R&D spending within the manufacturing sector was accounted for by companies involved in Engineering & Allied Industries (DK, DL & DM).

Figure 2.2: Manufacturing R&D Expenditure in 2002 by Division (SIC 2003 basis)⁹

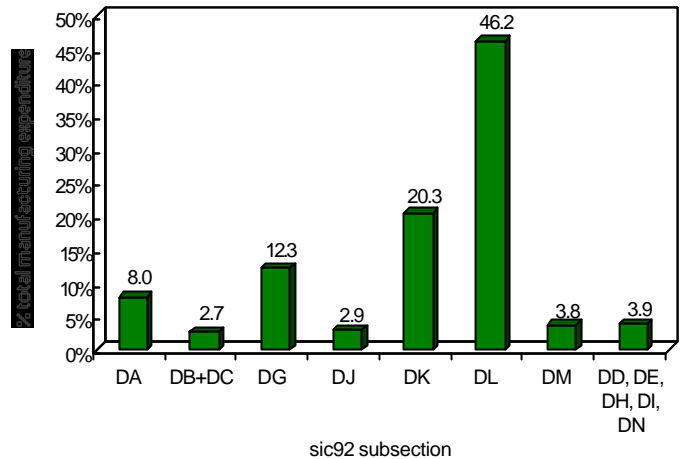


Figure 2.3: Manufacturing Expenditure by SIC 2003 Subsection

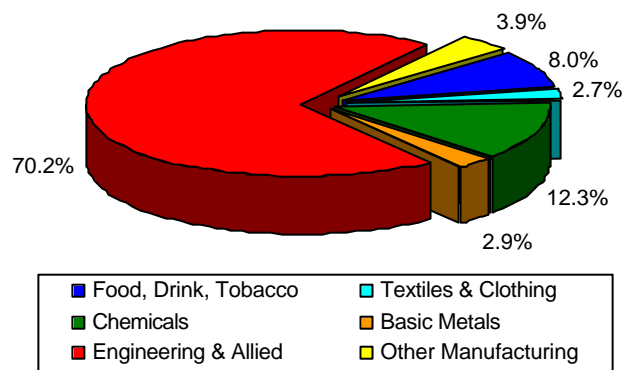
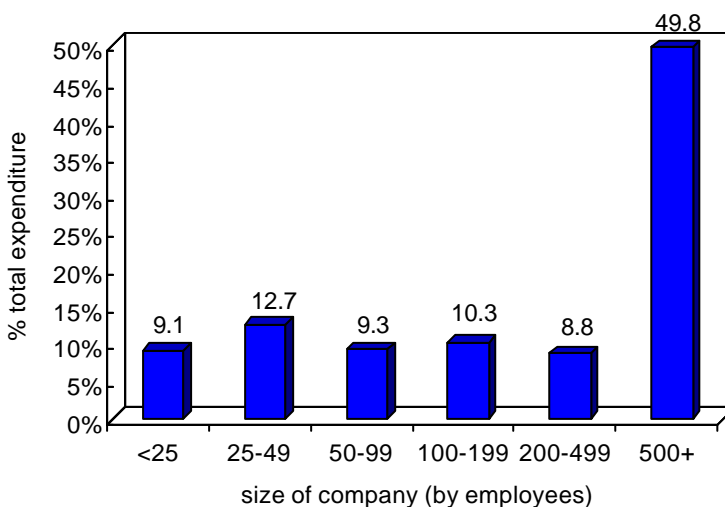


Figure 2.4: Total R&D Expenditure in 2002 by Company Size



Companies with 500 or more employees accounted for almost half of business R&D expenditure in 2002, although they represented only 6% of R&D performing companies.

Smaller firms (i.e. those with less than 50 employees) represented some 59% of R&D companies and accounted for 22% of total business R&D expenditure while R&D expenditure by medium-sized companies (i.e. those firms with between 50 and 499 employees) accounted for 28% of the total. Large companies therefore carry out a significant proportion of R&D.

⁹ For a description of subsection headings see Notes to Editors note 6.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – INTRAMURAL EXPENDITURE

Intramural expenditure is perhaps the most important component of total R&D as it shows the amount spent on R&D by firms in NI that was undertaken within Northern Ireland (extramural expenditure by companies in NI may be carried out in other parts of the UK or abroad). Intramural expenditure in Northern Ireland (in cash terms) remained fairly stable (-0.4%) between 2001 and 2002: this is compared to a 6.3% rise in the UK as a whole. Of the 11 other UK regions, nine showed a rise in intramural expenditure and two showed a decrease.

Table 2.3: Intramural Expenditure by UK Government Office Region (Cash Terms)

	Expenditure (£million)		% Change 2001-2002
	2002	2001	
UK	13,110	12,336	6.3
England	12,150	11,538	5.3
North East	128	119	7.6
North West & Merseyside	1,661	1,512	9.9
Yorkshire & Humber	357	298	19.8
East Midlands	1,063	951	11.8
West Midlands	695	662	5.0
Eastern	2,741	2,916	-6.0
London	950	738	28.7
South East	3,268	3,317	-1.5
South West	1,286	1,025	25.5
Wales	170	136	25.0
Scotland	640	512	25.0
Northern Ireland	149	150	-0.4

Note: Data for UK and GB regions are from the Office for National Statistics

As Table 2.4 shows, intramural expenditure, i.e. spending carried out within the company, accounted for over 95% (£149.3 million) of total expenditure in Northern Ireland in 2002 compared to 97% in 2001. The majority of both intramural and extramural expenditure was in the manufacturing sector.

Table 2.4: Intramural and Extramural Expenditure by Sector

	Intramural		Extramural	
	£m	% of Total Expenditure	£m	% of Total Expenditure
Manufacturing	112.9	72.0	5.7	3.6
Services & Other	36.5	23.3	1.6	1.0
All Industries ¹⁰	149.3	95.3	7.3	4.7

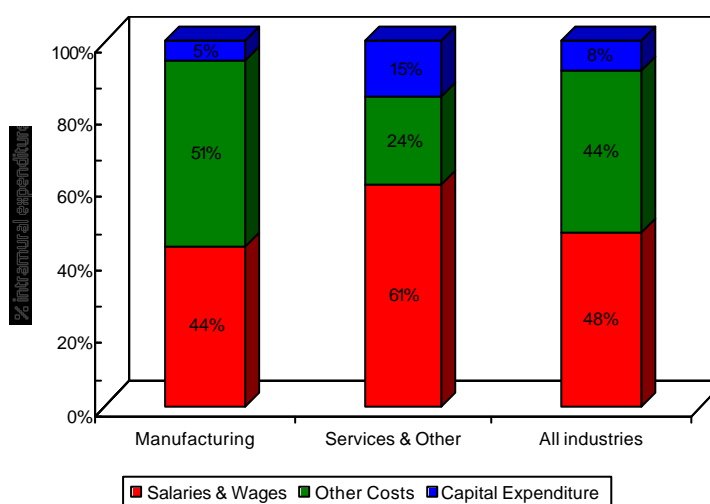
The two components of intramural expenditure are current expenditure (salaries & wages and other costs) and capital expenditure (land & buildings and plant & machinery).

¹⁰ All industries include manufacturing, service sector industries plus a range of other industries. For full details of the other industries covered see Notes to Editors note 6.

Table 2.5: Breakdown of Intramural Expenditure by Sector (£m)

	Manufacturing		Services		All industries	
	£m	%	£m	%	£m	%
Current Expenditure:						
Salaries & Wages	49.1	44%	22.0	61%	71.3	48%
Other Costs	57.6	51%	8.7	24%	66.4	44%
Capital Expenditure:						
Land & Buildings	0.5	1%	1.8	5%	2.4	2%
Plant & Machinery	5.7	4%	3.5	10%	9.3	6%
Intramural Expenditure	112.9	100%	36.0	100%	149.3	100%

Figure 2.5: Intramural Expenditure by Sector



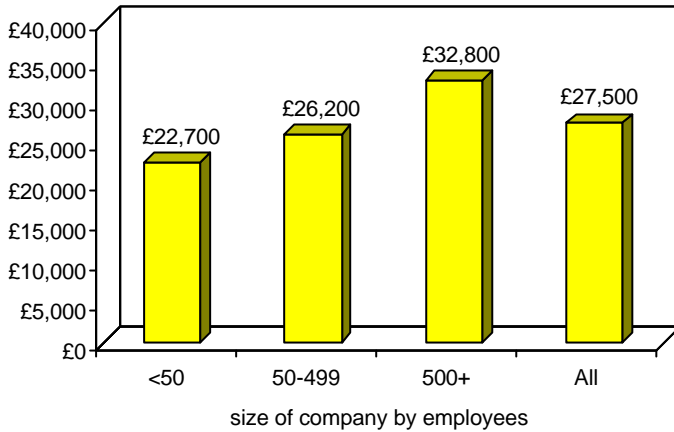
Current expenditure makes up 92% of intramural expenditure. Table 2.4 and Figure 2.5 highlights that there were differences between sectors in the categories of intramural R&D spend.

In the manufacturing sector, salaries and wages accounted for 44% of intramural expenditure, whilst in the services sector the corresponding figure was 61%. The proportion of intramural expenditure accounted for by capital expenditure was fairly stable in Manufacturing at 5% but has increased in the Services & Other sector to 15% compared to 10% in 2001.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – CURRENT EXPENDITURE

As Figure 2.6 below shows, there is a distinct difference in the level of salaries & wages per head between companies of different size (based on whole time equivalent figures).

Figure 2.6: Salaries & Wages per Head



Salaries and wages per head for large companies (500+ employees) is £32,800 per head, while for small and medium companies the figure is £22,700 and £26,200 respectively.

Analysis shows that, in large companies, a greater proportion of scientists are employed (79% compared to 65% for small and 74% for medium-sized firms). It is likely that scientists earn more than other operatives involved in R&D, which would account for the differences in average wages.

Current expenditure can also be looked at in terms of the type of research carried out. Experimental development accounts for 61.7% of current expenditure with applied research and basic research accounting for 35.6% and 2.8% respectively.

Figure 2.7: Type of Research by Company Size

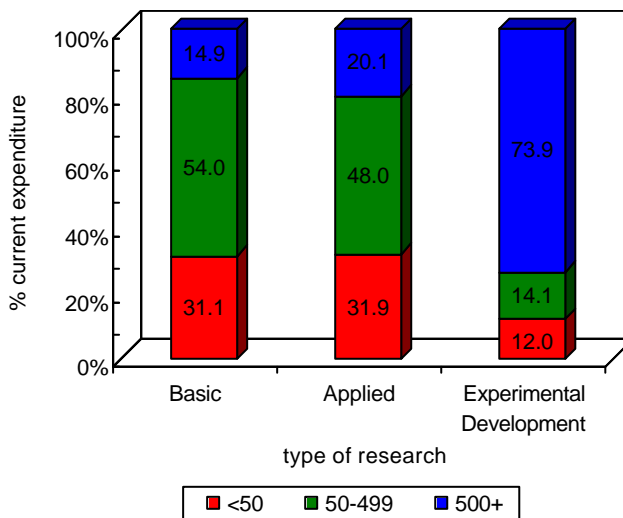


Table 2.6: Type of Research by Sector as % of All Research

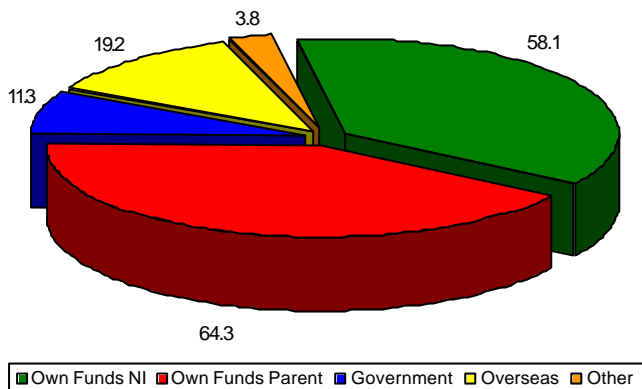
	Manufacturing	Services	All Industries
Basic	2.1	0.6	2.8
Applied	21.6	13.8	35.6
Experimental Development	53.7	7.9	61.7
All Research	77.5	22.3	100.0

Figure 2.7 shows that the majority of spending on basic research and applied research is carried out by medium-sized companies (i.e. those firms with between 50 and 499 employees) and that large companies (500+ employees) are dominant in terms of spend on experimental development. A detailed breakdown of the type of research carried out by both industry and company size is given in Annex 1. This annex shows that experimental development research undertaken by large manufacturing companies accounts for just under half (45.6%) of total current expenditure by all businesses.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SOURCES OF FUNDS

The funding of R&D (intramural and extramural) comes from a number of sources: the companies' own funds, from Government, overseas funding (e.g. EU) and other businesses or research councils.

Figure 2.8: Sources of R&D Funding (£m)



The majority of funding (78%) came from companies' own funds, with 7% from Government, 12% from overseas and 2% from other sources. The proportion of funding from own funds fell from 88% in 2001 to 78% in 2002.

Table 2.7: Percentage of R&D Funding by Source split by Company Size

	<50	50-499	500+	All
Own Funds NI	42.6	43.5	31.0	37.1
Own Funds Parent	40.7	47.8	37.4	41.1
Government	11.2	5.1	6.6	7.2
Overseas	1.0	0.5	23.9	12.3
Other	4.6	3.1	1.1	2.4
Total	100.0	100.0	100.0	100.0

Table 2.7 shows that, while companies with less than 500 employees reported that over four-fifths of R&D expenditure came from their own funds, larger businesses (i.e. 500+ employees) declared that just over two-thirds (68.4%) of R&D funding was provided from own funds.

The proportion of funding supplied by Government was much higher for small firms. These small businesses have reported that some 11.2% of funding came from government, while medium-sized businesses stated that around 5.1% of funding came from government and large businesses sourced 6.6% of R&D spend from government. It is worth noting that almost one quarter (23.9%) of funding for R&D within large companies, came from overseas, a much higher proportion than in previous years (for example, 6.7% in 2001).

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – OWNERSHIP ANALYSIS

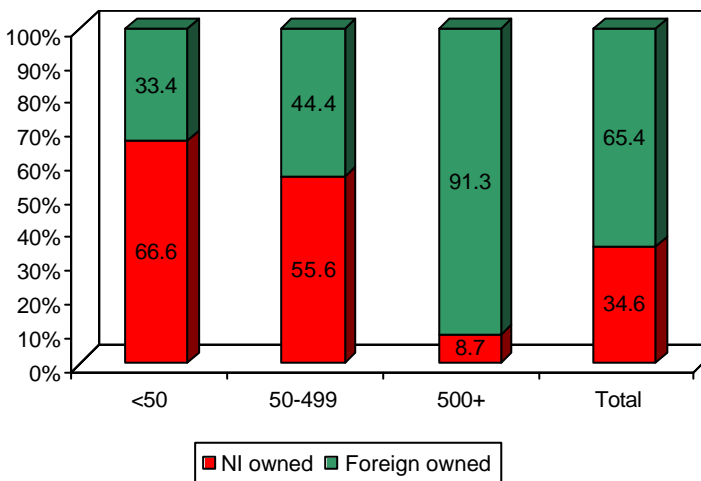
New to the 2002 Northern Ireland Business R&D Survey is an analysis by company ownership to establish levels of R&D expenditure by local or foreign-owned firms.

Table 2.8: Breakdown of R&D expenditure by ownership of company

	£m	%	Number of companies	%
Locally-owned companies	54.2	34.6	219	77.9
Foreign-owned companies	102.4	65.4	62	22.1
Total (All companies)	156.6	100.0	281	100.0

Table 2.8 shows that of the £156.6 million total R&D spend in 2002, almost two-thirds was by foreign owned companies (i.e. not NI-owned companies) although they accounted for only one-fifth of all R&D-performing companies. While almost four-fifths of all R&D-performing companies (77.9%) were Northern Ireland owned, they accounted for just over one-third of total R&D spend.

Figure 2.9: Expenditure by ownership by company size



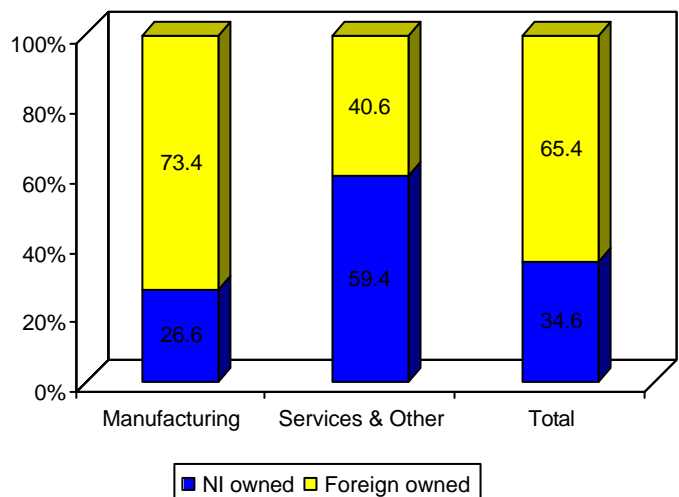
The majority of R&D spend in small companies (66.6%) and medium-sized companies (55.6%) was by Northern Ireland owned firms.

However, the analysis shows that, in large companies (500+ employees) the vast majority of R&D expenditure (over 90%) was by foreign-owned firms.

Figure 2.10: Expenditure by ownership by sector

Analysis of R&D spend split by ownership and sector shows that almost three-quarters of R&D spend in the manufacturing sector was by externally-owned companies.

In the Services & Other sector, however, Northern Ireland owned companies accounted for the majority (almost three-fifths) of R&D expenditure.



BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – EMPLOYMENT ON R&D

In 2002, companies surveyed reported a total of 2,720 employees working on R&D, approximately 6.7% of all employees in companies carrying out R&D. [The whole time equivalent figure¹² for the same period was 2,590 or 6.4%].

Figure 2.11: Total R&D Employment - Full-time, Part-time and Whole Time Equivalent

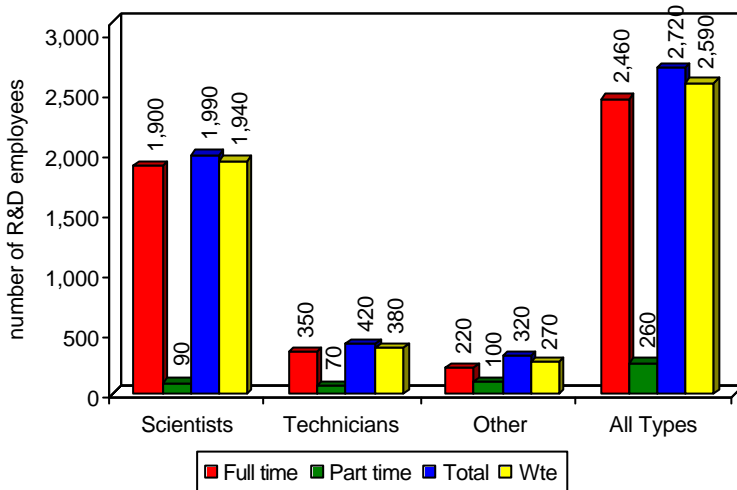
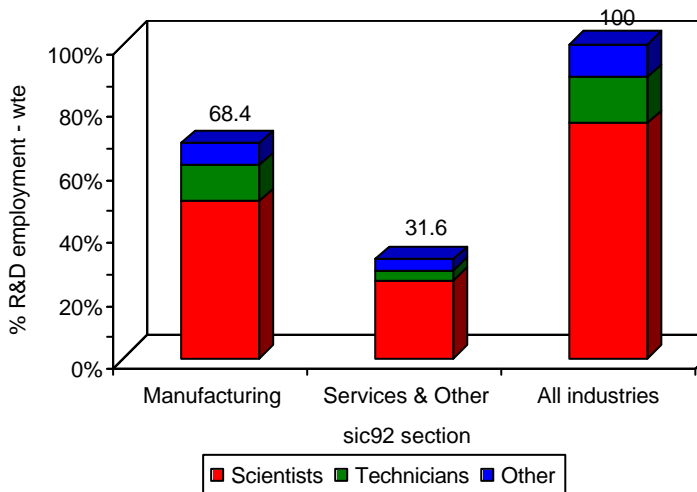


Table 2.9: Number of R&D Employees by Type

	Full time	Part time	Total
Scientists	1,900	90	1,980
Technicians	350	70	420
Other	220	100	320
All Types	2,460	260	2,720

Approximately 90% of all R&D employees were full-time. By type of R&D employee, scientists accounted for 73%, technicians for 15% and other employees (e.g. professional, administrative, clerical and industrial) for 12% of all R&D employees. Comparable whole time equivalent figures show that 1,940 employees were scientists (75%), 380 employees were technicians (15%) and the number of other employees was 270 (10%).

Figure 2.12: R&D Employment (whole time equivalent) by Sector



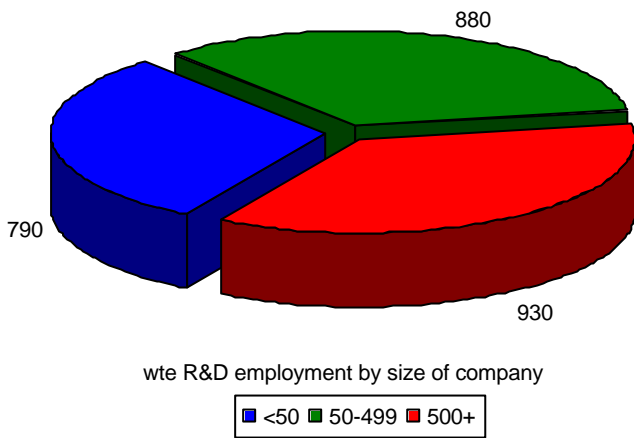
On a whole time equivalent basis there were 1,770 employees in manufacturing and 810 in the Services & Other sectors. Within manufacturing, scientists accounted for 73% of R&D employees with the level of technicians at 17% and other employees at 10%.

Within the Services & Other sectors, scientists made up just under 80% of R&D employees, technicians 11% and other employees 11%. The proportion of R&D employees in these sectors has almost doubled over the year, from just over 16% in 2001 to almost 32% in 2002.

¹² For an explanation of how whole time equivalent employment figures are calculated see Notes to Editors note 5.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – EMPLOYMENT ON R&D

Figure 2.13: R&D Employment (whole time equivalent) by Company Size

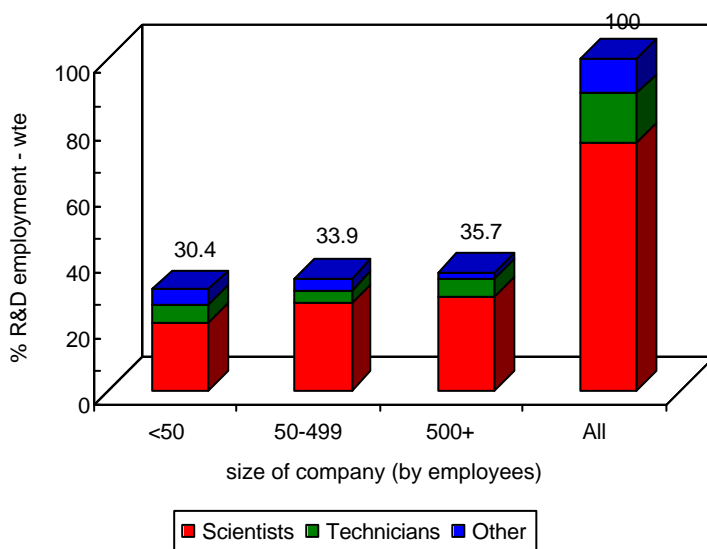


Using whole time equivalent employment figures, Figure 2.13 shows that total R&D employment is split across companies of different sizes as expected. That is, the greater proportion of R&D employees are in the larger companies (36%). However, there is a more even spread of R&D employment across size bands than in previous years (see also Figure 2.14). In addition, while R&D employment increased in the <50 and 50-499 categories between 2001 and 2002, there was a 22% fall over the same period (from 1,190 to 930) in R&D employees in 500+ companies.

There is a difference in the type of employee to be found in companies of different sizes. Just over three quarters (78%) of R&D employees in large firms are scientists, compared with 59% in small firms and 72% in medium-sized firms. Large companies employ fewer persons in the 'other' category (6%) than either small or medium-sized companies (approximately 11% and 8% respectively).

Figure 2.14 also shows the quite even spread of R&D employees across different size bands, with over 30% of all R&D employees working in firms with less than 50 employees, almost 34% in medium-sized firms and around 36% of all R&D workers employed by large companies.

Figure 2.14: R&D Employment (whole time equivalent) by Type of Employee and Company Size



BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT - NOTES TO EDITORS

1. The survey of Northern Ireland Civil and Defence Expenditure on Research and Development during 2002 was undertaken by Statistics Research Branch of the Department of Enterprise, Trade and Investment (DETI). The sample and survey results only cover 'business enterprises' as defined in the 'Frascati' manual. This excludes government organisations, higher education establishments and charities.

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 2001 survey carried out by DETI) and extra information from various sources such as ONS, Invest NI and a filter question on the Annual Business Inquiry. For the purposes of the 2002 survey, businesses were stratified into 4 groups:

- (i) Businesses responding to the 2001 DETI 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 2001 or 2002); 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 Northern Ireland businesses.

This businesses making up strata (i) and (ii) formed a register of R&D performers and the sample for the 2002 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.

In 2002, 595 forms were sent out to businesses believed to be performing R&D. Completed forms were returned by 533 businesses representing a response rate of 90 per cent. Estimates were made for the R&D activity of non-responding businesses.

2. This is the fifth business R&D survey carried out by DETI - it was carried out triennially between 1993 and 1999, but is now collected on an annual basis (from 2001 onwards). Prior to 2001, the Office for National Statistics (ONS) published regional intramural R&D estimates – including figures for Northern Ireland - from an annual UK-wide survey. The ONS Survey, as it related to Northern Ireland, was based on a relatively small sample of companies and was not detailed enough for DETI requirements. DETI therefore conducted its own benchmark survey every three years. In those years when both a UK-wide and a separate DETI survey were conducted, two estimates of intramural business R&D expenditure for Northern Ireland were therefore available. However, from 2001 onwards data from the DETI survey will be passed to ONS colleagues and intramural R&D figures for Northern Ireland from both sources will be equal.

3. 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&TD) 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 sources of funding question for the NI survey, for example, specifically identified Invest NI as one of the government sources.]

4. The survey covers expenditure in the year ending December 2002, although companies were given the option of supplying data for the business year ending on any date between 6 April 2002 to 5 April 2003.

It is worth noting that a number of NI companies are part of national and international companies. Many concentrate their R&D at particular sites, not necessarily in NI, although all of their plants, including those in NI, will share in the benefits of research. Variations may occur in NI R&D data from year to year due to the influence of one or two large-scale projects.

5. Definition of Terms

a) Type of R&D Expenditure

Total Expenditure on R&D - This covers civil expenditure by businesses, defence expenditure by businesses and other expenditure by Government. Due to disclosure rules, it is not possible to obtain a split between civil and defence R&D expenditure, for the 2002 survey.

Other Expenditure by Government - The ONS also collect annual data on Government-funded Science, Engineering and Technology for the UK as a whole and publish this in the 'Forward Look' document. By utilising Forward Look data in conjunction with the results from the DETI survey, it has been possible to compile a more complete picture of total expenditure on R&D in NI. Forward Look figures will include financial assistance to both higher education and to businesses by Government as well as expenditure on R&D conducted within Government Departments. The figures shown in Table 1, expenditure by businesses and higher education and other expenditure by Government, should compliment each other; i.e. there should be no double counting.

Intramural R&D – This is R&D carried out within the company.

Extramural R&D – This is R&D funded by plant(s) in Northern Ireland but undertaken by other firms or organisations in the UK and abroad.

Capital Expenditure - Includes companies' expenditure on land, buildings, plant and machinery (including vehicles). Capital expenditure on R&D is particularly subject to distortions and is likely to fluctuate significantly from year to year as a small number of projects could cause this percentage to increase or decrease sharply. For example, some R&D projects may have a duration of several years but involve heavy capital outlay in the formative years of the research. The erratic nature of R&D capital expenditure may partly explain differences in capital expenditure among companies of different sizes. Only by looking at underlying trends over several years will it be possible to see if some sectors or companies of differing sizes are more likely to require more expenditure of a capital nature.

b) **Type of Research**

Basic Research - work undertaken primarily for the advancement of scientific knowledge without a specific practical application in view.

Applied Research - Research undertaken with a general or a particular application in view.

Experimental Development - covers the use of the results of basic and applied research directed to the introduction of new materials, processes, products, devices and systems, or the improvement of existing ones. This includes the prototype or pilot plant stage, design and drawing required during R&TD and innovation work done on contracts with outside organisations, Government departments and public bodies.

c) **Sources of Funding**

Business - Funds from individual plants within NI or from parent or other companies within the group.

Government - Funds from Invest NI (including IFI), LEDU, DTI and other government sources.

Overseas - This includes EU Funds as well as other funds from outside the UK. EU funds are those from the European Commission's Structural or Framework Funds.

Other Funds - Funds from private individuals, private non-profit making bodies, higher education establishments, research councils and any other sources.

d) **Employment on R&D**

Staff Types - Average employment on R&D splits into the following categories; scientists and engineers, technicians, laboratory assistants and draughtsmen etc., and other (including Professional, Administrative, Clerical and Industrial Employees).

Whole Time Equivalent Employment - This is calculated by dividing the number of part-time employees by 2 and adding to the number of full-time employees.

6. Results are shown mainly by industrial sector and company size (based on the number of employees). The sectoral analyses are based on the Standard Industrial Classification (or SIC (92) classification) of industries.

Manufacturing is defined to cover Section D, which is composed of the following subsections:

DA	Food, Drink & Tobacco
DB	Textiles & Textile Products
DC	Leather & Leather Products
DD	Wood & Wood Products
DE	Pulp, Paper & Paper Products; Publishing and Printing
DG	Chemicals, Chemical Products & Man-Made Fibres
DH	Rubber & Plastic Products
DI	Other Non-metallic Mineral Products
DJ	Basic Metals & Fabricated Metal Products
DK	Machinery & Equipment Not Elsewhere Classified
DL	Electrical & Optical Equipment
DM	Transport Equipment
DN	Other Manufacturing Not Elsewhere Classified

Where aggregation of subsections within manufacturing is required this would normally be as follows (for example, see Figure 2.3):

DA	Food, Drink & Tobacco
DB+DC	Textiles, Leather, Footwear & Clothing
DG	Chemicals & Chemical Products
DJ	Basic Metals & Fabricated Metal Products
DK,DL + DM	Engineering & Allied Industries
DD,DE,DH,DI,DN	Other Manufacturing

The Service Sector covers Sections G through to O, namely:

G	Wholesale & Retail Trades
H	Hotels & Restaurants
I	Transport, Storage & Communication
J	Financial Intermediation
K	Real Estate, Renting & Business Activities
L	Public Administration and Defence
M	Education
N	Health & Social Work
O	Other Community, Social & Personal Service Activities

The Other Industries category covers:

A	Agriculture, Hunting and Forestry
B	Fishing
C	Mining & Quarrying
E	Electricity, Gas & Water
F	Construction

7. Figures contained within all tables in this Bulletin may not add due to rounding. Percentages calculated on these rounded figures may differ from those that are detailed in the text.

SECTION 3

HIGHER EDUCATION EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2002

NORTHERN IRELAND HIGHER EDUCATION EXPENDITURE ON RESEARCH & DEVELOPMENT DURING 2002

Table 3.1 below details the headline results from the 2001 and 2002 Higher Education Expenditure on Research & Development (HERD) surveys.

Table 3.1: Higher Education Expenditure on R&D

	£million	£million
	2002	2001
HERD Expenditure ¹³	107.4	100.3
of which:		
Current Expenditure	99.5	89.5
Capital Expenditure	7.9	10.8
<u>Source of funding of R&D:</u>		
Government Block Grant	70.7	60.7
OST Research Councils ¹⁴	6.4	6.7
UK-based charities	7.0	9.0
UK Cent Gov/Local Auth/Health ¹⁵	11.8	12.0
UK Ind/Comm/Pub Corp ¹⁶	3.7	3.5
EU Government	3.5	3.9
EU Other	0.7	0.7
Other Overseas	0.9	1.4
Other Sources	2.7	2.4
	Number	Number
HERD Employment ¹⁷	1,730	1,720
of which:		
Academic staff	730	730
TLAD's ¹⁸	610	680
Other ¹⁹	390	300

See Notes to Editors overleaf.

¹³ Expenditure for 2002 includes £1.6 million of expenditure funded by Northern Ireland businesses. Therefore, net HERD in 2002 was £105.8m (this is as detailed in Table 1.1). All university expenditure on R&D is intramural expenditure - i.e. R&D work carried out within the university. Figures given are in £millions and constituent parts may not add due to rounding.

¹⁴ Office of Science and Technology Research Councils.

¹⁵ Funding from UK Central Government, Local Authorities and Health Trusts/Hospitals.

¹⁶ Funding from UK industry/commerce/public corporations.

¹⁷ This is the number of full-time equivalents. Figures are rounded to the nearest 10 and constituent parts may not add due to rounding.

¹⁸ Technicians, Laboratory Assistants and Draughtsmen etc.

¹⁹ Includes Administrative, Clerical and Industrial Employees.

HIGHER EDUCATION EXPENDITURE ON RESEARCH & DEVELOPMENT - NOTES TO EDITORS

Table 3.1 details Higher Education Expenditure on R&D (HERD). The table gives combined results from the two main Northern Ireland universities - i.e. Queens University Belfast (QUB) and the University of Ulster (UU). The data collected refers to the academic year 2001/2002 ending 31/7/02. The universities have made data available for this period on the basis of Transparency Review data collected within each respective institution.

Transparency Review

The Transparency Review is a Government initiative, introduced with the Comprehensive Spending Review (CSR) in 1998. The CSR awarded £1.5bn of additional funding for Higher Education, but the Treasury made this conditional on the sector becoming more open about the way public funds are spent in universities and colleges.

A Steering Group was set up to implement the policy and their advice was referred to Government in the Transparency Review Report. This was endorsed in June 1999 and is now required policy for the sector. All institutions had to report transparently on the costs of their Teaching, Research, and other activities for 1999/2000 in July 2001 and each year thereafter. As a consequence, accurate and comparable R&D data for each university can now be obtained and this is presented in Table 3.1.

More detailed information on Transparency Review procedures in each of the local universities can be found at <http://www.qub.ac.uk/costing/> for QUB and at <http://www.ulst.ac.uk/finance/time/> for UU.

Total R&D Expenditure - Following consultation with the universities, it was agreed that all university expenditure on R&D is 'intramural' expenditure - i.e. R&D work carried out within the university.

Current Expenditure – Includes expenditure on salaries and wages and other costs (fuel, rent etc.).

Capital Expenditure - Includes expenditure on land, buildings, machinery and equipment. It should be noted that capital expenditure on R&D within universities is likely to fluctuate significantly from year to year. For example, an R&D project may have a duration of several years but involve heavy capital outlay in the formative years of the research.

Source of funding – this is split into nine separate categories as shown in table 3.1. For the purposes of this survey, the Government Block Grant was used as a 'balancing figure' with values for the other eight categories completed using data from the Transparency Review.

Employment on R&D – it is possible, using the results from the Transparency Review, to determine how much time members of staff spend on R&D. This has been converted to numbers of full-time equivalents in each of the three categories shown. Figures shown have been rounded to the nearest 10.

SECTION 4

ANNEXES TO BUSINESS EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2002

ANNEX 1

**Breakdown of Intramural Expenditure (Civil & Defence) 2002
£000's (rounded to nearest £100,000)**

	Current Expenditure						Capital Expenditure			
	Salaries & Wages	Other Costs	Current Expenditure	Basic Research	Applied Research	Experimental Development	Land & Buildings	Plant & Machinery	Capital Expenditure	Total Intramural Expenditure
Manufacturing										
<50	7,000	4,600	11,600	300	8,000	3,200	300	800	1,100	12,700
50-499	11,700	10,200	21,900	2,000	12,000	8,000	300	2,000	2,300	24,300
500+	30,300	42,800	73,100	600	9,800	62,700	0	2,800	2,800	75,900
Total	49,100	57,600	106,700	2,900	29,800	73,900	500	5,700	6,200	112,900
Services										
<50	10,800	4,500	15,400	800	7,600	6,900	1,800	2,300	4,200	19,500
50+	11,100	4,200	15,300	0	11,400	3,900	0	1,100	1,200	16,500
Total	22,000	8,700	30,700	800	19,000	10,800	1,800	3,500	5,300	36,000
All Industries										
<50	17,900	9,100	27,000	1,200	15,600	10,200	2,100	3,300	5,400	32,400
50-499	23,000	14,500	37,500	2,100	23,500	12,000	300	3,200	3,500	41,100
500+	30,300	42,800	73,100	600	9,800	62,700	0	2,800	2,800	75,900
Total	71,300	66,400	137,600	3,800	48,900	84,900	2,400	9,300	11,700	149,300

ANNEX 2

Breakdown of Extramural Expenditure (Civil & Defence) 2002 £000's (rounded to nearest £100,000)

	Extramural Expenditure			
	Expenditure within NI	Expenditure within GB	Expenditure outside UK	Total Extramural Expenditure
Manufacturing				
<50	800	200	0	1,000
50+	1,900	2,100	700	4,600
Total	2,700	2,300	700	5,700
Services				
<50	300	300	300	800
50+	800	0	0	800
Total	1,000	300	300	1,600
All Industries				
<50	1,100	500	300	1,800
50+	2,600	2,100	700	5,500
Total	3,700	2,600	1,000	7,300

ANNEX 3

Breakdown of the Sources of R&D Funding 2002
£000's (rounded to nearest £100,000)

	Own funds		Government Funds				Overseas Funds			Other Funds			
	NI	Parent	Invest NI	LEDU	DTI	Other	EU Structural	EU Framework	Other Funds Outside UK	Private Industry	Research Councils	Other Funds Within UK	Total R&D Funding
Manufacturing													
<50	6,400	5,900	1,200	0	0	0	100	0	100	0	0	0	13,700
50-499	15,600	9,100	1,800	100	0	100	0	0	100	100	0	0	26,800
500+	24,200	29,200	4,700	0	0	500	0	600	18,000	800	0	0	78,000
Total	46,100	44,300	7,600	100	0	600	100	700	18,200	900	0	0	118,500
Services													
<50	8,100	8,000	2,000	100	100	400	100	0	100	900	0	600	20,400
50+	3,600	11,900	400	0	0	0	0	0	100	1,200	0	100	17,300
Total	11,700	19,900	2,400	100	100	400	100	0	200	2,100	0	700	37,600
All Industries													
<50	14,600	13,900	3,200	100	100	400	100	0	200	900	0	700	34,200
50-499	19,300	21,200	2,200	100	0	100	0	0	200	1,300	0	100	44,400
500+	24,200	29,200	4,700	0	0	500	0	600	18,000	800	0	0	78,000
Total	58,100	64,300	10,100	200	100	1,000	200	700	18,400	3,000	0	800	156,600

ANNEX 4

**Breakdown of Employment on R&D 2002
(rounded to nearest 10)**

	Scientists				Technicians				Other				All Types			
	Full-time	Part-time	Total	wte	Full-time	Part-time	Total	wte	Full-time	Part-time	Total	wte	Full-time	Part-time	Total	wte
Manufacturing																
<50	190	20	210	200	40	30	70	60	40	20	60	50	270	70	340	310
50-499	360	20	380	370	80	30	110	90	60	40	100	80	500	90	590	540
500+	720	10	730	730	140	0	140	140	50	0	50	50	920	10	930	930
Total	1,270	50	1,320	1,300	270	60	320	300	150	70	220	180	1,690	170	1,860	1,770
Services																
<50	320	30	350	330	80	10	90	80	50	20	70	60	450	60	510	480
50+	300	10	310	310	0	0	0	0	20	10	20	20	320	10	340	330
Total	620	40	660	640	80	10	90	80	70	30	100	80	770	70	840	810
All Industries																
<50	510	50	560	530	120	40	160	140	90	50	140	120	720	140	860	790
50-499	670	30	690	680	80	30	110	100	80	50	130	100	830	100	930	880
500+	720	10	730	730	140	0	140	140	50	0	50	50	920	10	930	930
Total	1,900	90	1,980	1,940	350	70	420	380	220	100	320	270	2,460	260	2,720	2,590

If you require further information about this survey, please contact:

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