Department for **Innovation, Universities** & **Skills**

The 2007 R&D Scoreboard

Pharmaceuticals & Biotechnology – Sector Summary

BERR | Department for Business Enterprise & Regulatory Reform

Highlights

- The pharmaceuticals & biotechnology sector was the largest contributor to R&D in both the UK and globally in 2006;
- Three of the top 10 R&D investors globally are pharmaceuticals companies: one is GlaxoSmithKline;
- GlaxoSmithKline and AstraZeneca dominate the UK pharmaceuticals sector by R&D spend (73%);
- The large UK companies are very well positioned in the US pharmaceutical market, the largest by value and most profitable in the world: GlaxoSmithKline and AstraZeneca generated approximately 48% and 54% of their total sales in the US in 2006;
- Although investment in R&D has grown faster than sales both in the UK and globally, over the past 10 years the productivity of R&D in terms of the number of new molecular entities (NMEs) and biologics approved by the relevant agencies has declined;
- Although R&D is a major contributor to new innovative products, other factors also have a significant influence.

The pharmaceuticals & biotechnology sector

The pharmaceuticals & biotechnology sector was the largest contributor to R&D in both the UK and globally in 2006.

In 2006, UK pharmaceuticals & biotechnology sector firms among the UK850 invested £7.4 billion in R&D making this sector the largest investor in R&D by some distance.

Firms in the pharmaceuticals & biotechnology sector increased their R&D significantly in 2006, driven by factors such as increased regulatory stringency, safety concerns and high R&D attrition rates. While regulatory stringency increased the need for more accurate prediction of drug safety resulting in higher R&D costs, the high attrition rates led to relatively fewer drugs being approved, leaving companies with fewer new drugs to sell.

The R&D processes in the sector are extremely complex. They can be divided into basic research (which includes discovery and screening, lead development and pre-clinical evaluation) and the development process (which includes clinical trials). In terms of time and expenses, clinical trials are the most challenging. On average, it takes around 10 to 12 years from the time a drug enters initial clinical trials before it receives approval from regulatory agencies for sale to the public. As a result, investment in R&D today may not impact on a company's performance for at least a decade.

The pattern of R&D expenditure

Amongst UK firms

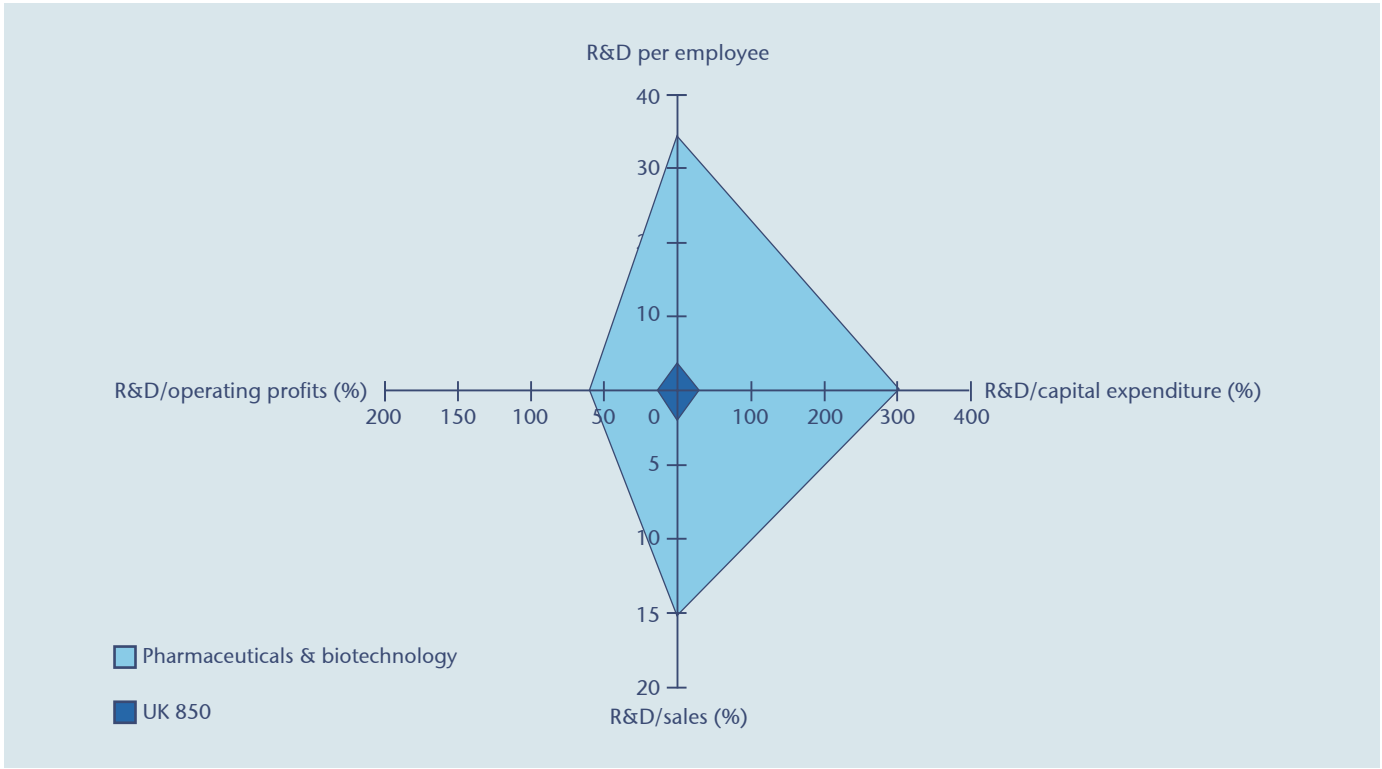
The UK pharmaceuticals & biotechnology sector is dominated by two large pharmaceuticals companies, GlaxoSmithKline (GSK) and AstraZeneca (see Table 1). The two companies combined represent 73% of the sector's R&D investment. This R&D concentration is not a surprise since large companies constantly need to add new products to their portfolio either through internal R&D or by external sourcing via acquisition or collaboration with smaller biotechnology or other pharmaceutical companies. However, despite a continuous increase in R&D spending over the past ten years, the productivity of R&D as measured by the number of new molecular entities (NMEs) and biologics approved by the approval agencies, has declined.

Table 1: The UK pharmaceuticals & biotechnology sector in UK850 – key facts

	FTSE100	FTSE Mid-250	AIM	AIM UK 50	Other listed	Unlisted	UK pharmaceuticals & biotechnology (total)	Of which: Foreign Owned
Number of companies	3*	1	34	1	19	56	114	43
R&D – 2006 (£ million)	5,605	9	106	10	262	1,427	7,420	1,242

* GlaxoSmithKline, AstraZeneca, Shire PharmceuticalsUS, reports in US dollars and most employees are outside the UK.

Figure 1: R&D intensity in the UK pharmaceuticals & biotechnology sector



Compared to other UK sectors, investment in R&D by firms in the pharmaceuticals & biotechnology sector was a very high proportion of sales (15.2%) (see Figure 1). The sector, however, had relatively low capital expenditure needs.

Amongst global firms

In 2006, the global pharmaceuticals & biotechnology sector accounted for 19.4% of R&D investment by the G1250 with an R&D spend of £47.4 billion.

The top ten companies in the sector accounted for 57.4% of total R&D spending within the sector. The increase in R&D spending by the pharmaceuticals & biotechnology industry sector pushed the sector ahead of technology hardware & equipment as the largest sector in the G1250. The largest pharmaceutical companies are from the US and Europe. Pfizer and Johnson & Johnson of the US were the largest, followed by GSK. The US is the largest and most profitable market for firms in the pharmaceuticals & biotechnology sector. GSK and AstraZeneca are well exposed to the US: with approximately 48% and 54% of their total sales were generated in the US in 2006.

The major firms

In the UK

The UK's pharmaceutical and biotechnology sector is dominated by GSK and AstraZeneca in both R&D spend and profitability (see Table 2). The figures from Pfizer and Eli Lilly that show the R&D investments and profitability of their UK subsidiaries are significantly smaller than the company's R&D investment globally of £3.9bn and £1.6bn respectively.

Although Shire's R&D intensity of 16.8% is one of the highest, its profitability (operating margin) of 2.2% is one the lowest, which highlights the challenges of R&D investment.

Table 2: The top five UK companies in the pharmaceuticals & biotechnology sector

Company	R&D investment (£ million, 2006)	R&D as a percentage of sales (%, 2006)	Operating profits as a percentage of sales (%, 2006)
GlaxoSmithKline	3,457	14.9	33.9
AstraZeneca	1,994	14.7	31
Pfizer	370	26.5	-1.9
Shire	154	16.8	2.2
Eli Lilly and Company	110	7.7	23.3
Total	**7,420**	**15..2**	**25.7**

Globally

Of the top five companies in terms of R&D spending in 2006, four are FT Global 500 companies. Within the FT Global 500, Pfizer and Johnson & Johnson are ranked number one and two and GSK and Sanofi-Aventis are ranked sixth and tenth respectively. As a result, 40% of the top ten R&D investors among the FT Global 500 are from the pharmaceuticals & biotechnology sector.

Table 3: The top five global companies in the software & computer services sector

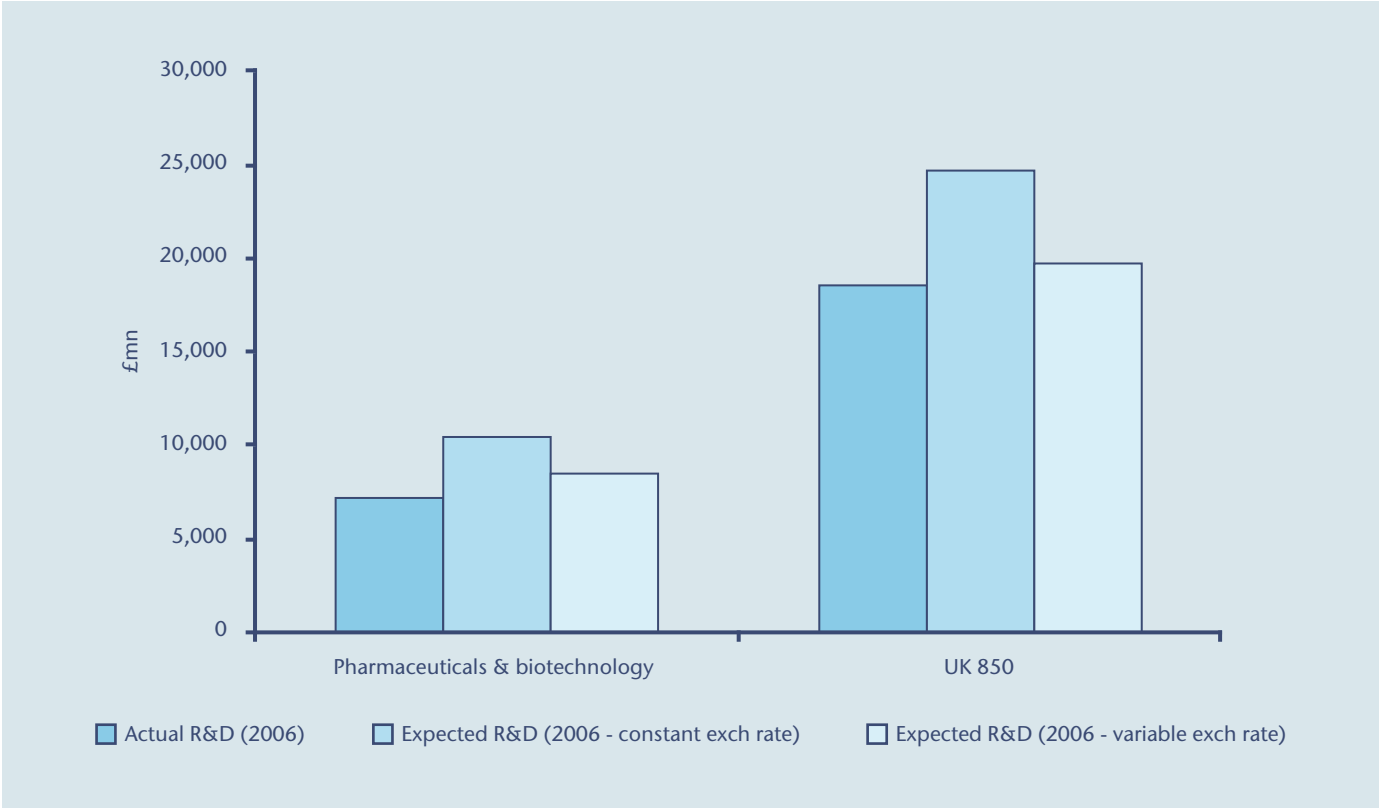
Company	Nationality	R&D investment (£ million, 2006)	R&D as a percentage of sales (%, 2006)	Operating profits as a percentage of sales (%, 2006)
Pfizer	USA	3,883	14.5	25.3
Johnson & Johnson	USA	3,640	13.4	25.9
GlaxoSmithKline	UK	3,457	14.9	33.9
Sanofi-Aventis	France	2,967	15.5	16.7
Roche	Switzerland	2,758	15.7	27.9
Total		**47,388**	**15.9**	**20.3**

Trends in R&D expenditure

In the UK

The UK pharmaceutical and biotechnology companies have grown their R&D spending faster than their sales. The UK sector's R&D investment grew by 10.5% and sales increased by 8.3% in 2006. Over the last four years these figures were even higher, with R&D spending at 12.2% and sales at 15.2%. The sector accounted for 35.5 % of UK850 R&D in 2006, three times as much as the aerospace & defence sector at 11.4%. The second largest sector in the UK by R&D spend. This highlights the financial resources of some large pharmaceutical companies as well as the need to bring new innovative (hence profitable) products to the markets as patents on many current blockbuster drugs are due to expire in the next few years.

Figure 2: Comparative performance of the UK pharmaceuticals & biotechnology sector



Actual R&D is calculated by using 2006 exchange rate retrospectively whilst ie variable exchange rates would use the foreign exchange rate on a yearly basis starting in 2002. By taking changes in exchange rates into account the impacted on the underlying data is significantly: using constant exchange rates the R&D spends of £7.4 billon would have been £1.2 billion higher.

Globally

The G1250 pharmaceuticals & biotechnology companies increased their R&D spending by 15.7% to £47.4 billion in 2006 while sales increased by 9.4%.

In 2006, sector R&D investment over four years rose by 35.1% with sales increasing 21.7% over the same period. In addition to rising global R&D expenditure, attrition rates in R&D departments have not improved significantly which continues to impact adversely on the number of NMEs and biologics being approved. This highlights the fact that increasing investment in R&D alone will not necessarily produce new, innovative products: there are other important factors that affect the success of R&D. Strategic investments, selecting therapy areas, entering alliances, improving the effectiveness of in-house R&D processes and talent recruitment recruiting are among factors contributing to the success of R&D. However, R&D as a percentage of sales of 15.9% was slightly higher for the global pharmaceutical sector than for the UK sector.

First published November 2007. Department for Innovation, Universities and Skills. www.dius.gov.uk
DIUS/PUB/3K/11/07/NP. URN 07/1566