

## UK Innovation Survey 2001

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### Summary

The results of this survey show that 47 per cent of enterprises in the UK were innovation active (as defined below) in the three-year period 1998-2000.

The main constraint on innovation was direct cost closely followed by the cost and availability of finance.

The major impact of innovation activities was on the quality of goods and services produced or supplied.

Internal and market were the most frequently cited sources of information for innovation. Technical and other formal standards were also important sources.

### Introduction

This article presents emerging results from the UK Innovation Survey 2001, covering the three-year period from 1998 to 2000. This is part of a wider third Community Innovation Survey (CIS) conducted by EU Member States (CIS 2 was in 1997). The UK survey was carried out in two parts: the main survey covering the whole of the UK, and a smaller top-up survey for the English regions. This article contains results of the entire sample.

Business innovation is a vital ingredient in raising the productivity, competitiveness and growth potential of modern economies. Providing the right economic conditions for, and using appropriate policy instruments to encourage innovation in the UK is a central objective for the Department of Trade and Industry (DTI). Measuring the level of innovation activity in the UK and identifying where policy might be best targeted contributes to the pursuit of that objective. The Community Innovation Survey complements other indicators of innovativeness by providing a regular snapshot of innovation inputs and outputs and the constraints faced by UK businesses in their innovation efforts, across the range of UK industries and business enterprises. It has the additional benefit of providing the basis for some comparisons with other European countries.

The majority of the survey is concerned with the technological side of innovation and we begin here by defining what is meant by innovation activity. We then discuss the

factors which hamper innovation, the impact of innovation on the business and the sources of information used. Finally, we touch briefly on aspects of non-technological innovation such as the introduction of new management techniques.

### **Innovation activity**

Innovation takes place through a wide variety of business practices and a range of indicators can be used to measure its level within the enterprise or in the economy as a whole. These include the levels of effort employed (measured through resources allocated to innovation) and of achievement (the introduction of new or improved products and processes). This section reports on the types and levels of innovation activity over the three-year (1998-2000) sample period.

We define innovation activity here as whether enterprises:

- have introduced a new or significantly improved good, service or process;
- were engaged in innovation projects not yet complete or abandoned;
- engaged in longer-term innovation activity such as basic R&D or technology watch;
- had expenditure in areas such as internal research and development, training, acquisition of external knowledge or machinery and equipment linked to innovation activities;
- formally co-operated on innovation activities with other enterprises or institutions.

**Table 1: Enterprises who are innovation active, by type of activity**

	Per cent of all enterprises		
	<i>Size of enterprise</i>		
	SMEs	Large	<i>All</i>
Innovation active	46	67	47
Product innovator	17	38	18
Process innovator	14	35	15
Innovation incomplete	15	31	16
Innovation-related expenditure	36	51	36
Longer term innovation activities	9	26	9
Innovation co-operation	7	24	8

Overall, 47 per cent of enterprises were classed as being innovation active in the period. Large enterprises were more likely to engage in some sort of innovation activity with 67 per cent innovation active as opposed to 46 per cent of small and medium-sized enterprises (SMEs) <sup>1</sup>.

In total, 18 per cent of enterprises had introduced new or significantly improved products or services in the sample period, and 15 per cent had introduced a new process. The level of product and process innovation is considerably greater in large firms.

Sixteen per cent of enterprises had innovation projects which were incomplete (either ongoing, abandoned or planned but not started) during the period. This demonstrates the continuous nature of innovation, not necessarily resulting in a new good, service or process in the sample period.

The large proportion of enterprises with some innovation-related expenditure (36 per cent) shows that firms recognise the need to allocate resources to innovation. The majority of those with innovation expenditure purchased machinery and equipment in connection with innovation (77 per cent of all firms with some expenditure) while some 19 per cent had in-house research and development expenditure.

Only 8 per cent of enterprises had co-operation arrangements on innovation activities. Seventy-one per cent of these “collaborators” had agreements on a national level. The most likely partners for co-operation agreements were suppliers (57 per cent of enterprises with co-operation agreements) followed by clients or customers (at 50 per cent). Around one third of collaborators included universities amongst their partners.

**Table 2: Partners for innovation co-operation**

<i>Type of partner</i>	Per cent of enterprises with co-operation arrangements					
	Region					
	Local	National	Europe	US	Other	Any
Other enterprises within enterprise group	14	17	14	12	6	45
Suppliers	14	37	16	9	5	57
Clients or customers	14	34	15	10	5	50
Competitors	7	12	5	3	2	20
Consultants	11	19	2	3	1	29
Commercial laboratories/R&D enterprises	5	11	4	4	0	19
Universities/ higher education institutes	15	19	6	2	1	34
Government research organisations	5	9	3	1	1	13
Private research institutes	3	8	2	2	0	13
Any	44	71	34	26	13	100

Firms in production and construction industries were more likely to be innovation active than those in distribution and service based industries. The difference between these types of firm is marginal at the SME level but more pronounced in larger firms.

Large firms are more likely to engage in every form of innovation activity, the difference in production and construction based firms being the greater. For example, large production and construction enterprises were three times more likely to introduce new or improved products than SMEs in the same industry, compared with twice as likely in the distribution and service sector.

**Table 3: Enterprises who are innovation active**

	Per cent of all enterprises		
	<i>Size of enterprise</i>		
	SMEs	Large	<i>All</i>
Production and construction	47	75	48
Distribution and services	44	55	45
<i>All</i>	46	67	47

**Factors hampering innovation**

An important dimension of policy analysis is the extent to which market or other factors constrain the ability of enterprises to innovate successfully. These can be obstacles that the enterprise encounters while carrying out innovation activities as well as factors preventing innovation.

The survey asked about a range of constraining factors and the strength of any effect on the ability to innovate. Table 4 shows the proportion of respondents who each indicated a high importance for each constraint category.

Cost factors were the most cited, including the direct resource costs of innovation activities and the cost and availability of finance. In particular, obtaining affordable finance was more often a problem for SMEs than for larger enterprises.

More enterprises felt constrained by economic circumstances than by internal factors, although the lack of qualified personnel was viewed as one of the more important factors constraining innovation. The impact of regulations and standards was also thought to be a substantial barrier to innovation, particularly for SMEs.

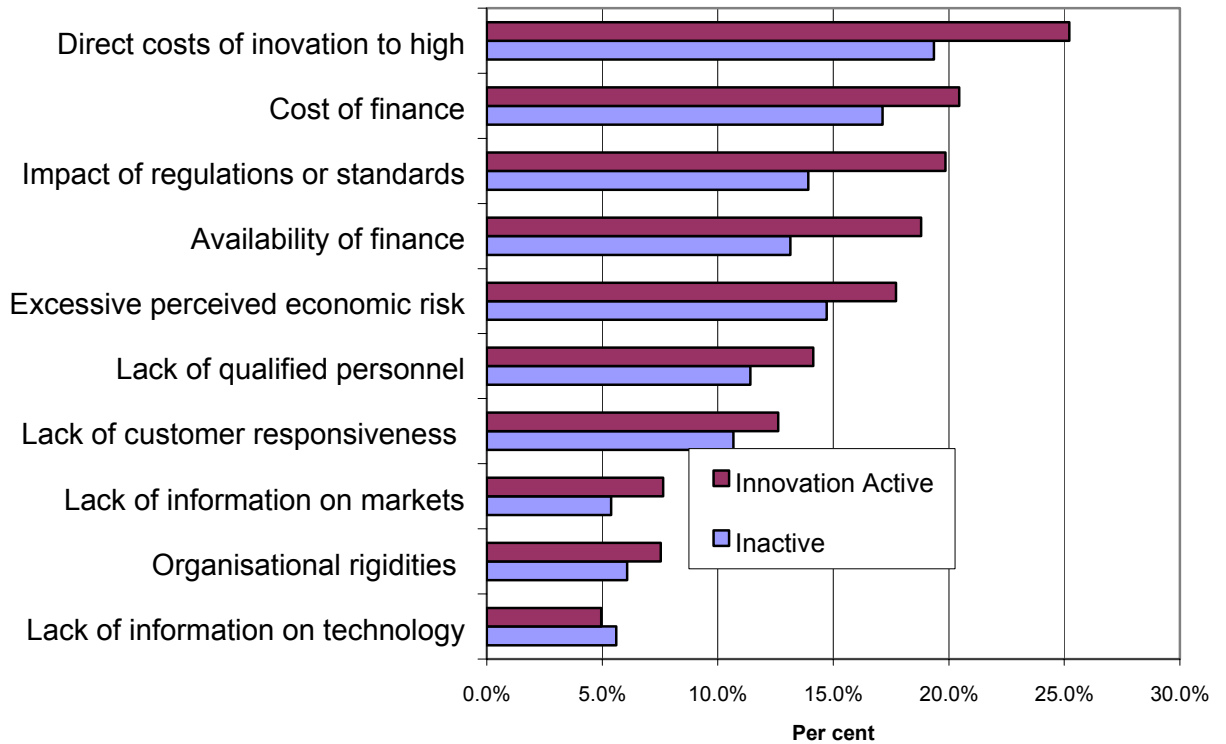
**Table 4: Enterprises grading innovation inhibiting factors as high**

		(Per cent of respondents)		
		<i>Size of enterprise</i>		
		SMEs	Large	All
<b>Economic Factors</b>	Excessive perceived economic risk	16	14	16
	Direct innovation costs too high	21	20	22
	Cost of finance	19	11	19
	Availability of finance	16	12	16
<b>Internal Factors</b>	Organisation rigidities	7	9	7
	Lack of qualified personnel	13	9	13
	Lack of information on technology	5	3	5
	Lack of information on markets	7	5	7
<b>Other Factors</b>	Impact of regulations or standards	17	13	17
	Lack of customer responsiveness	12	12	12

It should be noted that in all of these categories the hampering factors were rated high more often by enterprises who were innovation active than those who were not. This

implies that these specific constraints were a relatively small element in explaining complete absence of innovation activity.

**Chart 1: Enterprises grading innovation-inhibiting factors as high**



**Effects of innovation**

Enterprises innovate to improve competitiveness, leading to enhanced profitability. The survey sought information about the intermediate effects of innovation, on the market position and internal processes and costs.

Respondents were asked to rank a number of potential effects as having no impact or grade the impact as low, medium or high. The proportion of innovation active respondents who answered high in each category is shown in Table 5.

The striking feature of the results is the spread of responses across the range of impacts, with no single type predominating. Generally, product-related impacts were more often cited than process (cost) impacts, with quality enhancements top rated. This suggests a strongly customer-focused approach to innovation. More large enterprises than SMEs attributed a high impact to their innovation activities, possibly due to economies of scale.

The least cited impact was reducing materials and/or energy per produced unit, although this was over twice as important for large firms than for SMEs. For large enterprises, their innovation activities had least impact on improving environmental or health and safety aspects.

**Table 5: Enterprises grading impact of innovation as high**

Per cent innovation active of respondents

<i>Effect</i>		<i>Size of enterprise</i>		
		SMEs	Large	All
<b>Product oriented</b>	Increased range of goods or services	9	15	9
	Opened new market or increased market share	9	12	9
	Improved quality of goods or services	12	15	12
<b>Process oriented</b>	Improved production flexibility	6	11	7
	Reduced unit labour costs	5	12	6
	Increased capacity	8	12	8
	Reduced materials and/or energy per produced unit	3	6	3
<b>Other</b>	Improved environmental impact or health and safety aspects	4	8	5
	Met regulations or standards	8	11	8

**Sources of information**

It is important to know how enterprises relate to external sources of technology and other innovation-related knowledge and information, as innovation is increasingly complex, requiring the co-ordination of multiple inputs. Firms can gain guidance, advice or even inspiration for their prospective innovation projects from a variety of both public and private sources.

Respondents were asked to rank a number of potential sources on a scale from no relationship to high importance. The proportion who answered high in each category is used in the table. These sources are:

- **internal:** from within the enterprise itself or other enterprises within the enterprise group;
- **market:** from suppliers, customers, clients, consultants, competitors, commercial laboratories or research and development enterprises;
- **institutional:** from the public sector such as government research organisations and universities or private research institutes;
- **professional:** from conferences, trade associations, technical/trade press or fairs and exhibitions;
- **specialised:** from technical standards, health, safety and environmental standards and regulations.

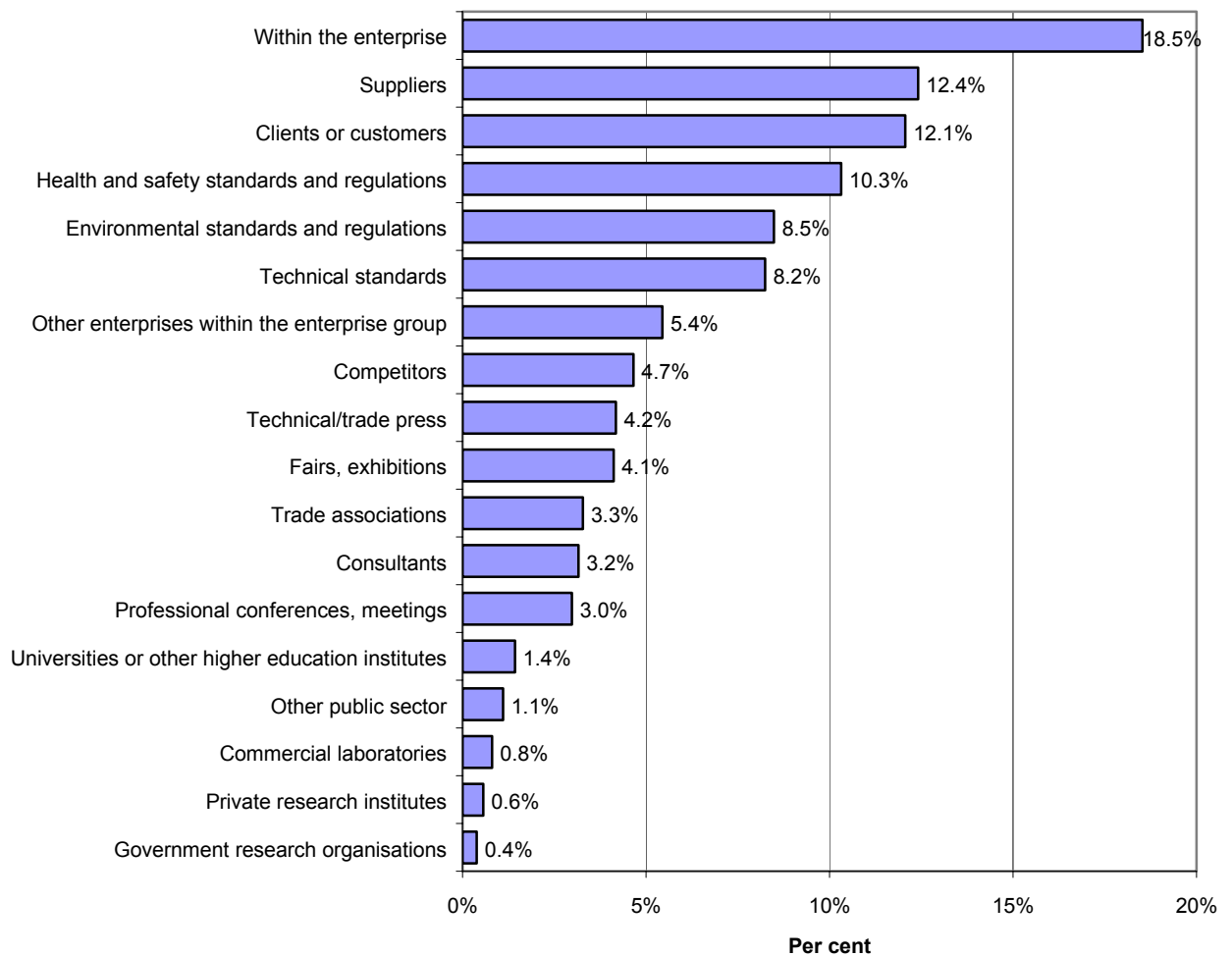
Both large firms and SMEs regard internal and market sources as being the most important for information on innovation. This suggests that enterprises tend to rely on their own experience and knowledge coupled with information from suppliers, customers and clients, fitting in with the customer-focused view on the effects of innovation in table 5. By far the least employed were institutional sources such as government and private research organisations.

**Table 6: Enterprises grading importance of information sources as high**

Source	Per cent of all respondents		
	Size of enterprise		
	SMEs	Large	All
Internal	20	39	21
Market	22	34	22
Institutional	3	4	3
Professional	9	12	9
Specialised	14	19	14

Of all the sources used, those from within the enterprise itself were most important (19 per cent of enterprises). Each of the specialised sources were rated highly with health and safety standards (at around 10 per cent) narrowly above environmental and technical standards. Of the market sources, suppliers and customers were considerably more important sources of information on innovation than consultants, competitors or commercial laboratories.

**Chart 2: Proportion of respondents grading importance of information sources as high (detail)**



## Wider innovation

Innovation is not wholly about the development or use of technology. Enterprises can also change their behaviour or business strategies to make themselves more competitive, often in conjunction with technological change.

Enterprises were asked whether they have made major changes to their business structure and practices in the three-year period 1998-2000. As would be expected, a far greater proportion of large firms engaged in some sort of wider innovation than SMEs. Overall, a change in marketing strategy was most often cited with the introduction of advanced management techniques the least. Large firms were most likely to adopt new organisational structures, although a high proportion also engaged in the other three areas listed below. SMEs were less than half as likely to have introduced a major organisational change.

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**Table 7: Enterprises with wider innovation activity (per cent of all enterprises)**

	Per cent of all enterprises		
	<i>Size of enterprise</i>		
	SMEs	Large	All
Change in corporate strategy	35	67	36
Advanced management techniques	29	58	30
New organisational structures	30	67	32
Change in marketing strategy	40	62	41

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## Use of e-business

The widespread use of the Internet - including for electronic-based commerce - has been a major feature of recent years. This has potentially far reaching implications for all businesses. The survey touched in a limited way on this large issue. The main findings are:

- around 79 per cent of enterprises were using the internet in some way or another, for large firms this was 93 per cent;
- its most popular uses were for gathering information and having a presence on the Web in the form of a web site or page. Less common was the use of the Internet as a medium to sell goods or conduct commerce with other businesses.

E-commerce activity in business is measured in detail by the ONS in a dedicated survey (see [www.statistics.gov.uk/themes/economy/articles/e\\_commerce.asp](http://www.statistics.gov.uk/themes/economy/articles/e_commerce.asp)).

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**Table 8: Use of e-business**

	(per cent of all enterprises)		
	<i>Size of business</i>		
	SMEs	Large	All
Basic internet presence	60	68	60
Internet used for information	60	77	61
Customers can place orders through the internet site	15	23	15
Commerce with other businesses through the internet site	17	19	17
One or more of the above	79	93	79

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## **ANNEX A – Methodology**

The UK Innovation Survey is funded by the Department of Trade and Industry (DTI). The survey was conducted on behalf of the DTI by the Office for National Statistics (ONS), with assistance from the Northern Ireland Department of Enterprise, Trade and Investment (DETI).

The UK Innovation Survey is part of a wider Community Innovation Survey (CIS) covering the EU. The survey is based on a core questionnaire developed by the European Commission (Eurostat) and Member States. This is the third iteration of the survey – CIS 2 was carried out in 1997 and the results form part of various EU benchmarking exercises (see [www.cordis.lu/innovation-smes/scoreboard/home.htm](http://www.cordis.lu/innovation-smes/scoreboard/home.htm)).

The UK Innovation Survey 2001 was carried out in two parts. The first sampled 13,340 enterprises and covered the whole of the UK whilst the second was an England-only top up (of 6,287 enterprises) to allow the construction of regional indicators.

The survey was voluntary and conducted by means of a postal questionnaire. A copy of the questionnaire used can be found on [www.dti.gov.uk/tese/science.htm](http://www.dti.gov.uk/tese/science.htm).

### *Coverage*

The survey covered enterprises with 10 or more employees in sections C-K of the Standard Industrial Classification (SIC) 1992. All SIC production and construction divisions are included i.e. sections C (mining and quarrying), D (manufacturing), E (electricity, gas and water supply) and F (construction). In distribution and services only SIC 51 (wholesale trade except of motor vehicles) is included from section G (wholesale and retail trade; repair of motor vehicles and personal and household goods) with section H (hotels and restaurants) excluded completely. Sections I (transport, storage and communication), J (financial intermediation) and K (real estate, renting and business activities) are included in their entirety.

### *Sampling*

The first sample was drawn from the ONS Inter-Departmental Business Register (IDBR) on 16 March 2001 with the top up following on 30 October. The unit of analysis was the enterprise – for larger firms this is usually a business unit (which must be a legal entity and have a certain degree of autonomy), for smaller firms it is often the whole company.

The survey was stratified by Government Office Region in England, and by Scotland, Wales and Northern Ireland. Each of these regions contained 12 industry SIC groupings and 5 employment sizebands. The sample was drawn using optimal allocation (based on the proportion of innovators from CIS 2) with a minimum cell size (which varied by the population in each region). Almost 16 per cent of the targeted 126,775 enterprises in the population were sampled.

### *Response and weighting*

The questionnaires from the initial survey were distributed on 2 April 2001. Enterprises not responding received written reminders in mid-May and mid-June with the second reminder also including a copy of the questionnaire. Finally, around 1,000 non-responding enterprises were contacted by telephone in an effort to further boost response rates.

The top up survey was distributed on 9 November with only one reminder sent. The data collection was closed at the end of February.

Of the 19,602 enterprises selected, 8,172 valid responses were received (along with a small number of returned questionnaires from enterprises which had ceased trading) to give a response rate of 42 per cent. The population and achieved sample are summarised below.

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**Table 9: Summary of sample frame**

	Number of enterprises					
	Population			Achieved sample		
	SMEs	Large	All	SMEs	Large	All
Production and construction	60,716	3,033	63,749	3,740	827	4,567
Distribution and services	61,096	1,930	63,026	3,044	561	3,605
<i>All</i>	121,812	4,963	126,775	6,784	1,388	8,172

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The results in this article are based on weighted data in order to be representative of the population of firms. The responses were weighted back to the population using the inverse sampling proportion in each stratum i.e. the weight attributed to each enterprises was the number of enterprises in the population divided by the number of responses in that stratum. On average each respondent represents 23 enterprises in the population.

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<sup>1</sup> Small and medium sized firms (SMEs) are defined here as having less than 250 employment. They are not necessarily independent companies in their own right.