ECONOMICS

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DTI OCCASIONAL PAPER NO. 6

Innovation in the UK: Indicators and Insights

JULY 2006

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The views expressed within the DTI Economics Papers are those of the authors and should not be treated as Government Policy

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Innovation in the UK

Introduction

Innovation is at the heart of policy towards increasing competitiveness and productivity in the UK, to enable continuing improvements in the standard of living, in a globalising and very competitive world. Innovation in business can lead to higher and sustainable profitability or the ability to meet competition and provide higher value to customers. At the national economy level, innovation can be shown to be a major factor in the growth of output and of productivity. It offers a way of meeting other challenges including maintaining and improving our environment and improving the quality of life through better healthcare, transport systems and a range of other parts of the infrastructure that supports the economy and society. Some novel solutions to problems will be implemented by public policy agencies, but most will draw on the inventiveness and capabilities of private businesses, both large and small. Policies towards innovation can help to promote wealth creation and new approaches to these wider problems. For theses policies to be well founded, government needs a good understanding of how the processes leading to innovation operate and the amount and types of innovation activity in the UK.

A variety of measures and indicators have been developed and incorporated in setting and monitoring of national objectives. Data on research and Development spending by business, universities and Government is regularly collected and published and comparisons drawn with the investment in these areas by other leading economies. Statistics on the number of patents of UK origin are also included in the international comparisons that are monitored for policy purposes.

These can be thought of largely as measures of new technology, an essential element of innovation for businesses and for the nation as a whole. But it has long been understood that the development of new technology and other new knowledge is not the only necessary element in innovation. For its full productive impact, knowledge has to be disseminated and used, usually in conjunction with complementary inputs such as staff and management skills and the appropriate forms of business organisation and strategy. The regular innovation surveys provide measures of many of these complementary assets and how all the parts work together can usefully be thought of as a national system of innovation, the complex interplay of market forces, institutional arrangements and the stocks and flows of knowledge that enables and supports business innovation.

The innovation surveys carried out regularly in the UK, in parallel with broadly common surveys in other European countries, provides a sweeping panorama of the range and complex interdependencies in the innovation system. The surveys produce indicators that can be applied in setting policy objectives and in monitoring outturns. But they also shed light on the modes and processes underlying the outturn indicators, so that the complexities can be at least partially grasped and policies designed and applied with better knowledge of how the innovation system as a whole may respond.

Innovation Concepts

The surveys, carried out in the UK, other European countries and in many others round the world follow general guidelines set out in an OECD publication known as the Oslo manual (OECD 2005). This offers suggestions on the conduct of innovation surveys, including statistical procedures and a review of the range of concepts that fall together under the umbrella term innovation. These include:

- product innovation – bringing to the market or into use by business, new and improved products, including both tangible goods and the provision of services. The degree of innovativeness is shown by the distinction between products new just to the business or which are also new to the market.
- process innovation, significant changes in the way that goods or services are produced or provided, again differentiating between processes new to the business only or also new to the industry.
- categories of investment such as: R&D, capital goods and software acquisition, design activity, for implementing current innovations or directed to future product or process changes
- management related types that have sometimes been referred to as soft or wider innovation, such as strategic changes to the organisation of business or its functions, in order to achieve gains in competitiveness through efficiency or service improvements.

The manual also summarises as a guide to survey principles, other elements of the innovation system, especially the ways that knowledge stocks and flows serve as vital innovation inputs. The UK and other European innovation surveys, known collectively as the Community Innovation Survey, take a broadly common form and ask mostly the same questions, enabling some degree of international comparison, within the limits of differing national systems, institutions and economic histories. The latest revision of the manual seeks to enlarge the range of core innovation concepts to encompass major changes in business processes under the heads of organisational and marketing innovation. This change has not yet been implemented in most surveys. In the UK innovation survey 2005, these are treated as strategy changes in a separate section of the survey form and this report covers them as distinct types but explores their interaction with the established concepts of product and process innovation.

The manual discusses the various theoretical perspectives for understanding innovation outcomes and processes, and the highly complex range of activities and their interconnections in the modern economy. All of these perspectives have some insights to bring to bear on how to structure evidence gathering in the field and to interpreting the results. The surveys based on the manual are relatively eclectic and can provide data for many different approached to modelling innovation for research and policy purposes.

The UK surveys

This is the fourth of these surveys in the UK. The previous iterations have been built into innovation policy formation. For example, they are a source for indicators used in the system of public service agreements that set innovation objectives and means of tracking their achievement, across all Government Departments. The indicators are also included in the basket of measures in the Ten year framework for Science and Innovation Investment (HMT report, 2004), that sets longer term objectives. The results form a major resource for research into the nature and functioning of the innovation system and for the formulation and quantification of policy. Many studies of relevance to public policy and to a deeper understanding of the laws of motion of the innovation system have been undertaken by university economists and analysts. The DTI encourages this work through regular meeting of a Survey User Group[1] and through sponsoring research projects with an immediate policy focus. This volume includes one such commissioned study by Professor Peter Swann on the knowledge exchange interface between innovating businesses and the public research base. DTI Economics papers have also used applications of the survey results to inform new thinking about policy issues for example, Economics paper 12 (DTI Economics paper No. 12, 2005) looked afresh at the role of standardisation in innovation, while Paper 15 (DTI Economics Paper No.15, 2005) on Design and Creativity, deployed data from the 2001 survey on the role of design in UK innovation. Chapter 2 (Section 2) in this volume also takes some of those findings further and highlights innovation in the creative industries.

[1] For examples of the analyses presented at the group meetings see http://www.dti.gov.uk/innovation/innovation-statistics/cis/cis-ug05/page11849.html

The Innovation Survey 2005

A brief selection of results from the latest UK survey was published in *Economic Trends* in March 2006. The present volume is also mostly concerned to present factual material from the survey in a form that is accessible and useful to a range of stakeholders, policy analysts, researchers and business. Most of the report has been prepared by the DTI analysts involved with conducting the survey (in close co-operation with the team from the Office for National Statistics) and in the management and use of the resulting data.

This volume includes some comparisons between the results of the 2005 surveys and the previous iteration in 2001. The sectoral coverage of the 2005 survey was widened considerably to represent a larger proportion of the service sector. To make valid like-for-like comparisons requires that the additional sectors are excluded from the analysis. As a result the indicator values used in comparisons will not match other data published in this volume and existing publications[2]. See Annex A for more details.

The structure of the report is as follows.

The first section on Indicators, summarises a wide selection from the many variables and sets of relationships between them, concentrating on the shares of businesses in a range of industrial sectors, UK regions and size groups, who are engaged in innovation related activities including networking with external sources.

The second section, on Insights, takes a closer focus on particular aspects of the innovation system revealed by the survey data. Following on from the coverage of network activity, Chapter 1 (Section 2), by Peter Swann, takes the analysis further, for the case of the publicly funded research base and the ways in which innovation in business is intertwined with it. A central theme of innovation policy is to stimulate productive knowledge transfer between the highly successful UK research base and other innovating agencies and firms. Chapter 2 brings out some of the role of design in innovation together with some analysis of the creative industries. Chapter 3 takes a close look at management strategies – 'wider' innovation – and at the main markets and customer groups and how innovation propensities vary with these demand characteristics. Chapter 4 investigates why enterprises do not innovate and what kind of barriers they face.

[2] This also applies to international comparisons where care needs to be taken to ensure that the sector coverage used in the analysis is the same for the UK and its international comparisons

SECTION 1.
INDICATORS

Introduction

This Section provides summaries of the main survey results by means of a range of indicators, giving the broad picture of innovation in the UK. The results are presented mainly as shares of businesses grossed up to nationally representative levels by appropriate survey weights. (Details on the statistical properties of the survey, the weights used and other conventions applied in drawing up the indicators are in the technical notes at Annex A.)

The survey sought information on the nature of the business activities involved in innovation as well as the effects of product and process innovation on market position, internal processes and costs. The report defines a business as innovation active if it is engaged in any of the following:

- Introduction of a new or significantly improved product (good or service) or process for making or supplying them.
- Innovation projects not yet complete, or abandoned;
- Expenditure in areas such as internal research and development, training, acquisition of external knowledge or machinery and equipment linked to innovation activities.

There is also some inquiry into the nature of demand for new and improved products and into the linkages through knowledge acquisition and co-operation, with other enterprises and institutions such as the research base.

Changes over time – 2001 and 2005 surveys

The innovation surveys have so far been implemented at four yearly intervals, although the frequency is changing to biennial from 2007. There is then a snapshot view of the state of innovative activities over two periods of time. As noted above, the sectoral coverage of the surveys in 2001 and 2005 were somewhat different and the comparisons of results included below are on the basis of the sectors included in both.

Some headline findings from the survey are that:

- On the definition above, some 57 per cent of UK enterprises were innovation active over the 2002-2004 period.
- Product or process innovations have been implemented by around 30 per cent of enterprises.

- On a like for like comparison with the previous survey, these represent a substantial increase. In 2001, only 45 per cent of UK enterprises were innovation active and a quarter were product or process innovators.
- As the propensity to innovation increases with enterprise size, a much higher share of economic activity and employment is in businesses who innovate.
- Enterprises may also be investing in preparing for future innovation or amending their organisational structures or strategies. Including these forms of innovative behaviour and change, 61 per cent of UK enterprises were broader innovators over the period.
- Innovation activity appears to be largely independent of geographical location, with analysis showing limited regional variation.

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).

The survey also includes coverage of 'Wider Innovation' – major changes in management practices, business structure, organisation or marketing strategy. 'Broader Innovator' is defined as enterprises that are either innovation active or wider innovators or both.

Table 1.1 shows the shares of businesses by size of enterprise that fall into these categories.

Table 1.1: Main indicators by enterprise size, percentage of all enterprises

Per cent	All 10+	10-49	50-249	250+
Innovation active	57	55	67	72
of which,				
Product innovator	25	23	33	39
Goods	16	14	24	28
Services	17	17	18	23
Process innovator	16	14	21	31
Ongoing/abandoned activities	10	9	14	21
Innovation-related expenditure	54	52	64	68
Wider Innovator	33	30	45	58
Broader Innovator	61	58	71	79
Either product or process innovators	30	28	40	48
Both product and process innovators	11	10	15	22

- The majority of businesses are involved in some form of innovation directed actions, even if not bringing new products or processes into use over the three year survey period. Within this group, most are investing in the implementation or development of future products or processes, with only a small proportion bringing in only wider innovations. The share of enterprises who are innovation active increases with business size.

Sector variations

The share of enterprises within broadly defined sectors (defined at Annex A) also varies by type of innovation activity. Table 1.2 shows the percentages under each of the innovation categories.

Table 1.2: Main indicators by sectors, percentage of all enterprises

Per cent	Primary sector	Engineering-based manufacturing	Other manufacturing	Construction	Retail and distribution	Knowledge intensive services	Other services
Innovation active	54	73	70	44	52	69	47
of which,							
Product innovator	14	38	34	12	22	37	17
Goods	11	35	30	5	15	18	7
Services	9	16	14	9	14	31	16
Process innovator	19	24	24	6	10	28	11
Ongoing/abandoned activities	10	18	15	2	6	19	5
Innovation-related expenditure	53	72	68	42	46	66	44
Wider Innovator	38	40	37	26	29	47	24
Broader Innovator	63	76	73	50	56	73	50
Either product or process innovators	24	44	40	14	25	47	21
Both product and process innovators	9	18	17	4	7	17	7

- Engineering-based manufacturing records the largest share with current or future product or process innovation plans.
- Knowledge intensive services are the most likely to review their business structure or practices.
- Construction records the lowest share with innovative propensity. Particularly, only 12 per cent introduce new or significantly improved products.

The regional dimension

These summary indicators can also be analysed to show the extent of innovation across the countries and regions of the UK.

Table 1.3: Innovation by region, percentage of all enterprises

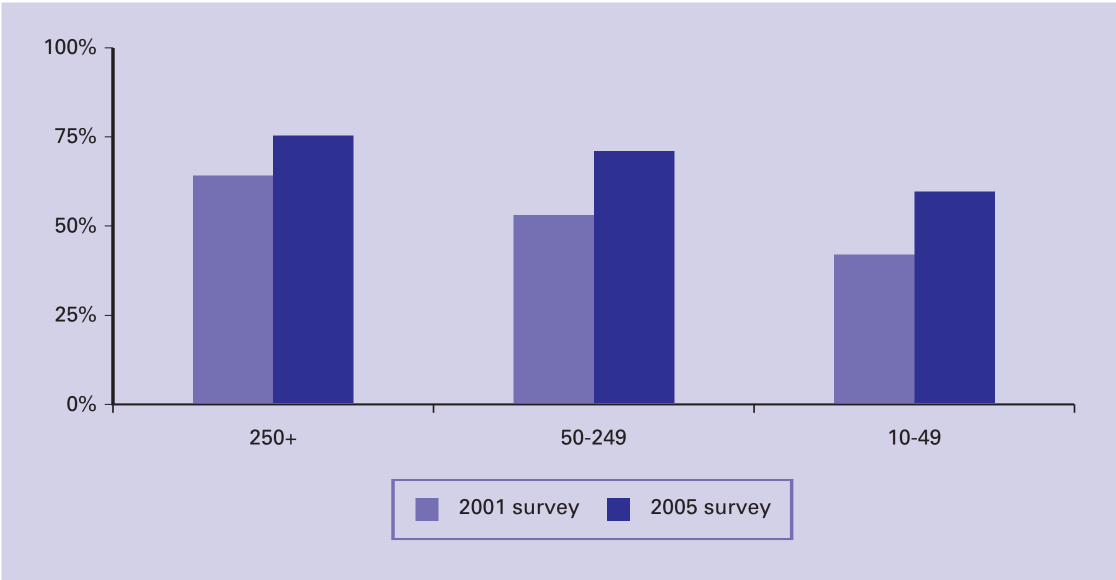
Per cent	North East England	North West England	Yorks & the Humber	East Midlands	West Midlands	Eastern England	London	South East England	South West England	Wales	Scotland	Northern Ireland
Innovation active	57	58	58	57	55	55	57	60	57	57	56	56
of which,												
Product innovator	25	24	25	27	24	26	27	28	25	24	22	21
Goods	16	16	17	19	18	16	14	18	16	18	14	13
Services	18	15	17	17	14	16	23	19	17	15	15	14
Process innovator	16	15	15	16	16	17	17	16	16	16	16	19
Ongoing / abandoned activities	8	8	10	9	10	11	10	13	11	8	10	6
Innovation-related expenditure	54	55	56	53	53	52	53	56	55	55	53	54
Wider Innovator	30	33	32	33	30	33	37	36	33	30	32	26
Broader Innovator	60	62	62	60	58	60	61	64	61	60	60	59
Either product or process innovators	30	28	30	32	30	31	33	32	30	28	28	30
Both product and process innovators	12	11	10	11	10	12	11	11	11	12	10	10

- Innovation activity ranges from 55 per cent of enterprises in West Midlands and Eastern England to 60 per cent in the South East, with the relative results for the ranges of indicators showing no constant pattern across the regions.
- Wider innovation seems to be marginally more frequent in London and the South East, and least important in Northern Ireland.

Changes over time – 2001 and 2005 surveys

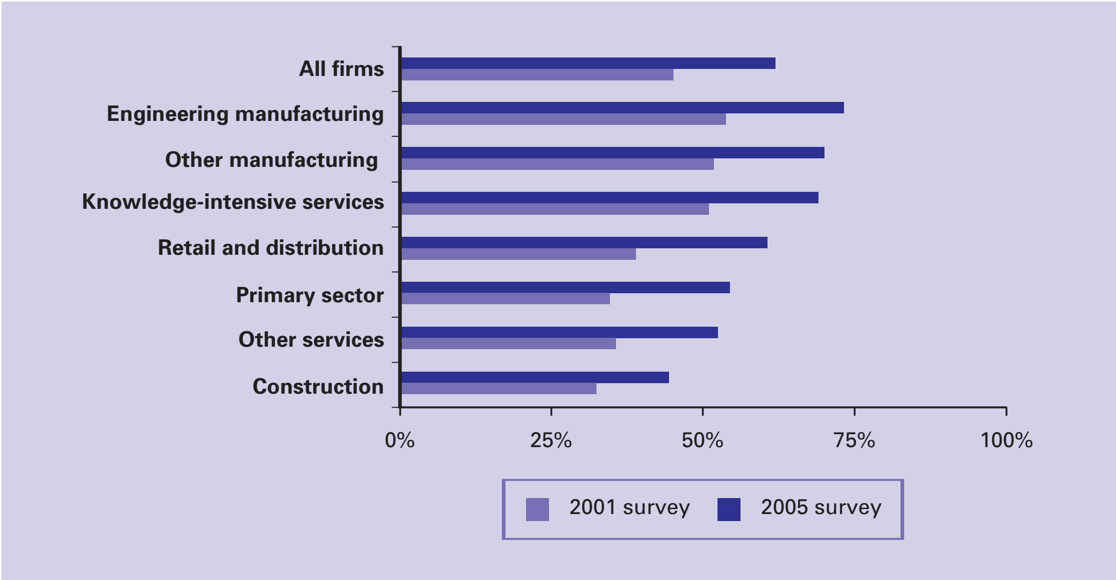
The following two figures make comparisons with the previous survey held in 2001.

Figure 1.1: Percentage of innovation active enterprise 2001 to 2005, percentage of all enterprises: by size group



- Innovation activity levels have increased substantially across all enterprises, especially SMEs where innovation active rates have risen by 17 percentage points.

Figure 1.2: Percentage of innovative enterprise



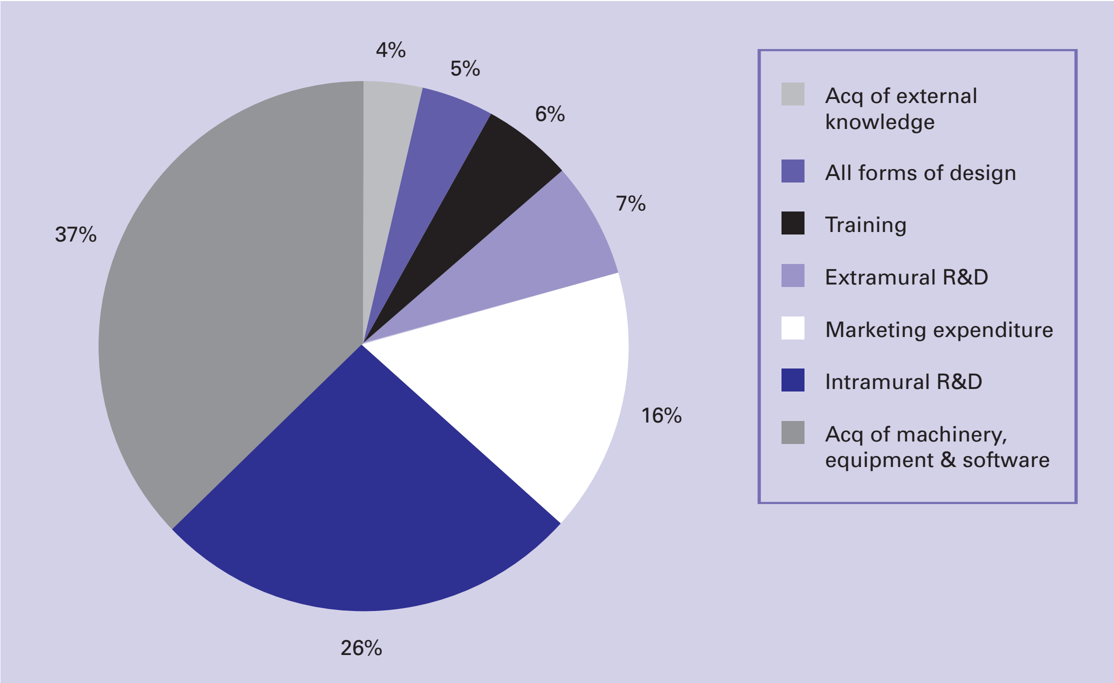
- The increase in innovation activity applies in all sectors of the economy ranging from 12 percentage points in Construction to 22 percentage points in Retail and distribution.

Investing in innovation

Figure 1.3 shows the breakdown of innovation directed investments by type of expenditure. Much analysis and a range of government policy initiatives are focused on R&D, because of the breadth and depth of new knowledge it entails. But intramural (within the firm) R&D is one part of the overall innovation investment picture, accounting for around one quarter of relevant expenditures[2]. Extramural (contracted out) accounts for 7 per cent). Investment in capital goods, and equipment, including computers and software, is the largest proportion. This can be equated to acquiring embedded technology including information and communications technology developments and shows the importance to national innovation performance of the diffusion of technical change. Expenditure on market preparation, in connection with innovation is the third largest component, showing the importance of effective marketing and distribution to achieve the commercial benefits of innovation in products and processes. Technology and knowledge need to be married to market preparation and promotion to be effective.

[2] The survey includes question on R&D expenditure alongside other types of relevant investment, but it is not a substitute for the Business R&D Survey carried out annually by the Office for National Statistics which covers all known R&D performers.

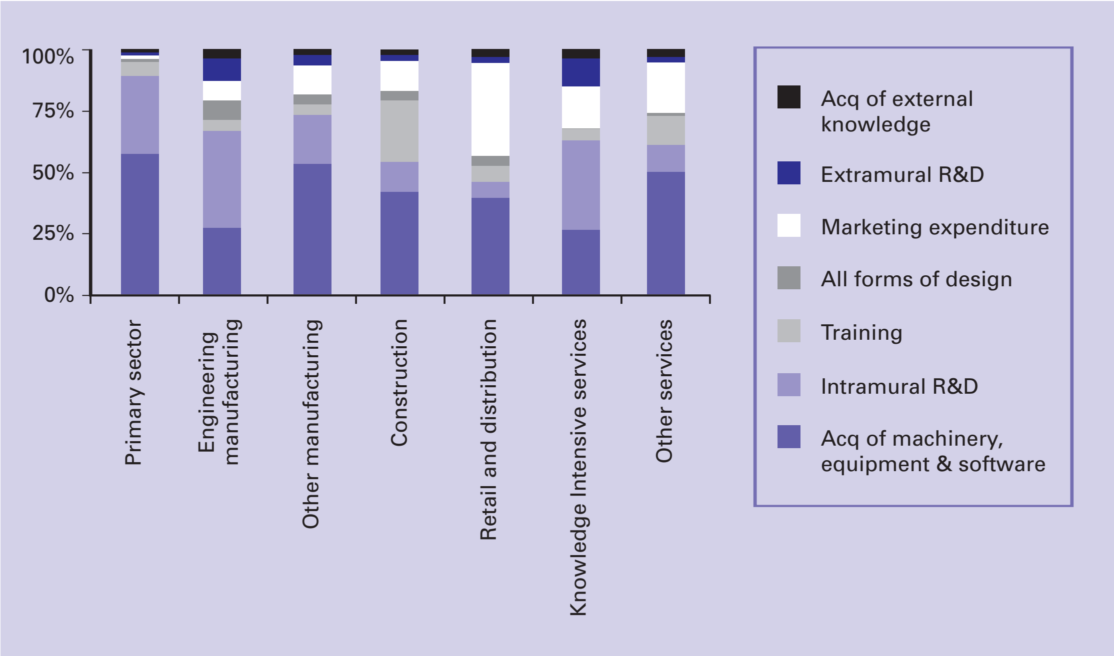
Figure 1.3: Innovation expenditure, all respondents



- Developing staff skills specifically in connection with current and future innovation is a surprisingly low share of these expenditures.
- Expenditure on design related to innovation is a relatively modest share of the total turnover of the UK design industry (Design Council, 2005.) This may be consistent with a suggestion that the UK's design capabilities while used widely, are less strategically deployed in pursuit of innovation.

This pattern shows some significant variation across broadly defined business sectors, as summarised in Figure 1.4.

Figure 1.4: Shares of Innovation Expenditure by sector

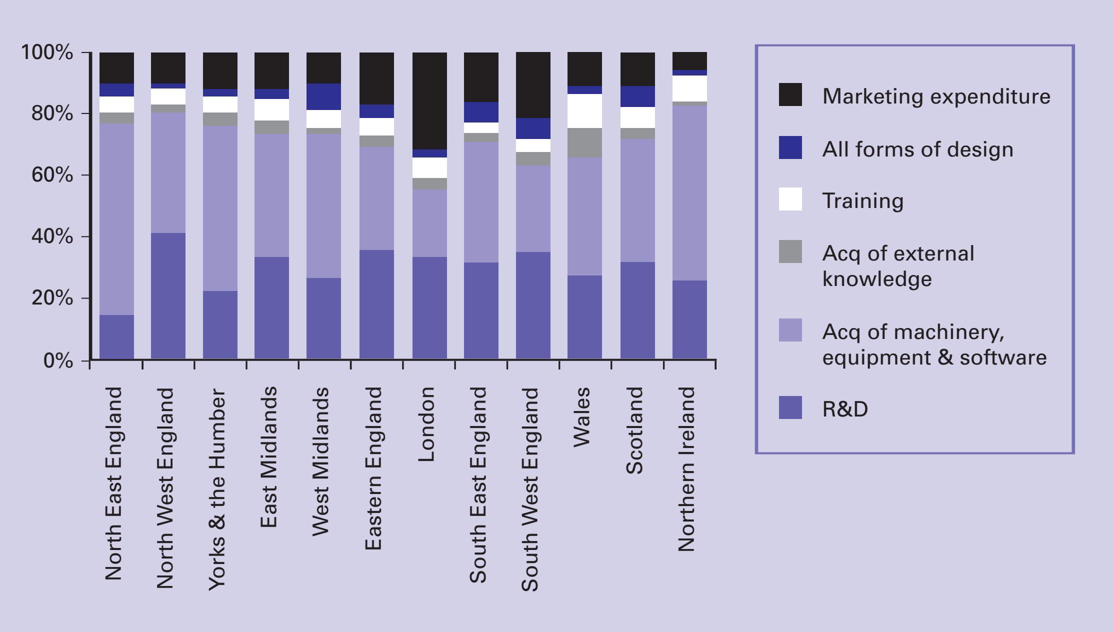


- It is notable that the construction sector puts a higher share of its innovation related development into training and, perhaps a surprisingly low share into design functions.
- Although business R&D expenditure is concentrated in manufacturing sectors, knowledge intensive services emerge as relatively R&D intensive.

The regional dimension

Figure 1.5 also shows some significant geographical variation. In addition to R&D expenditure, already understood to be heavily skewed (DTI Economics Paper No.11, 2005) large variability appears in acquisition of equipment and machinery along with marketing expenditure.

Figure 1.5: Shares of Innovation Expenditure by region

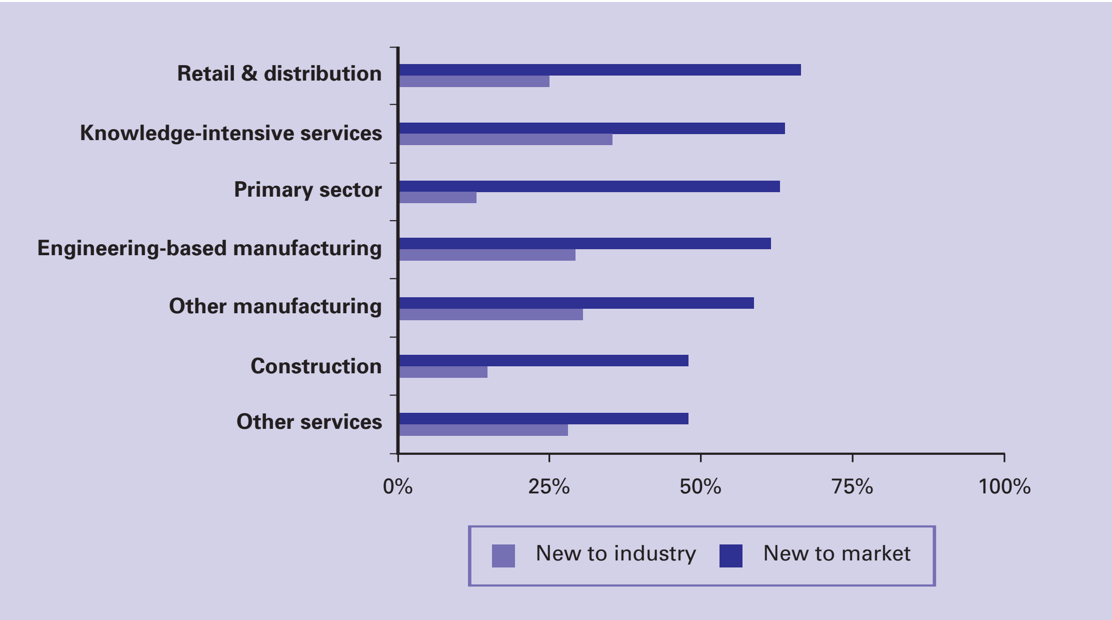


Product and process; novel innovation

The intensity of product and process innovation also emerges from the survey. One indicator is the share of product and process innovations that are said to be new to the market or to the industry respectively.

Figure 1.6 shows respectively the percentage of enterprises introducing new products to market and new processes to industry for the seven broadly defined industry groups.

Figure 1.6: Novel innovation, product/process innovative enterprises only

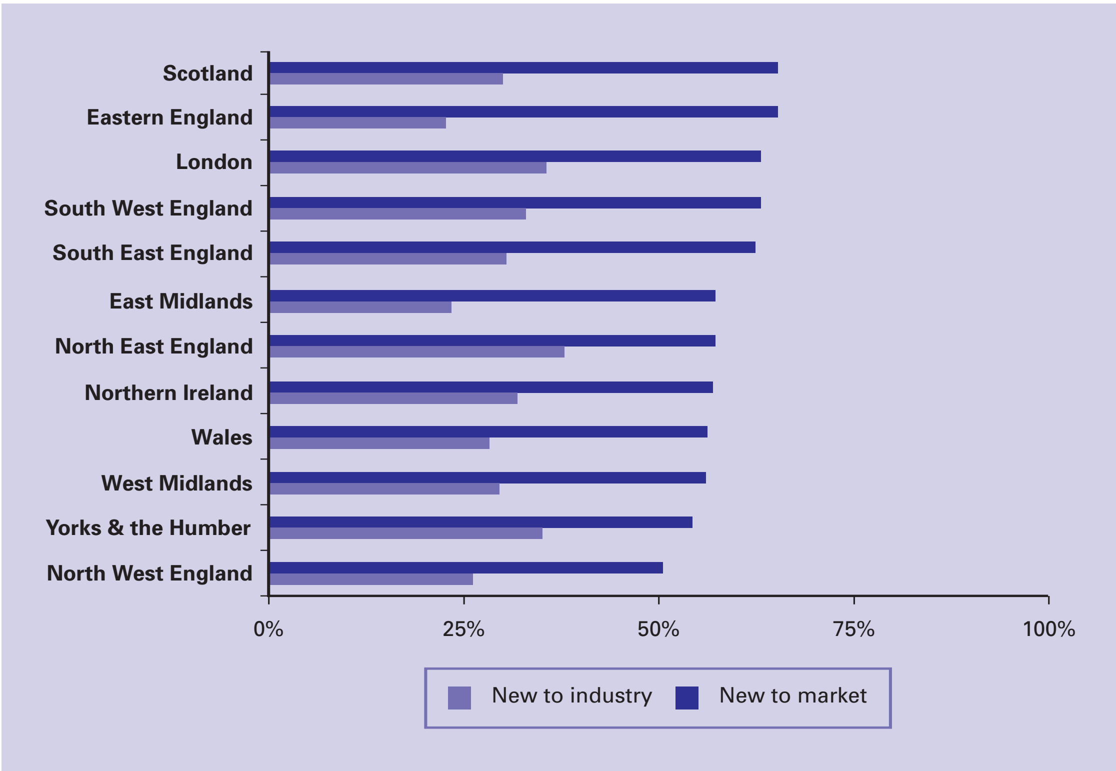


- It is striking that, in most sectors, more than half of product innovative enterprises are also novel product innovators, introducing goods or services new to their market, rather than follower innovators, trying to catch up with the competition, they are pro-actively keeping ahead of the competition;
- Process innovation is more complex and likely to involve more extensive change. On average, around only a quarter of process innovative enterprises were novel process innovators.

The regional dimension

Figure 1.7 shows respectively the percentage of enterprises introducing new products to market and new processes to industry for the regions.

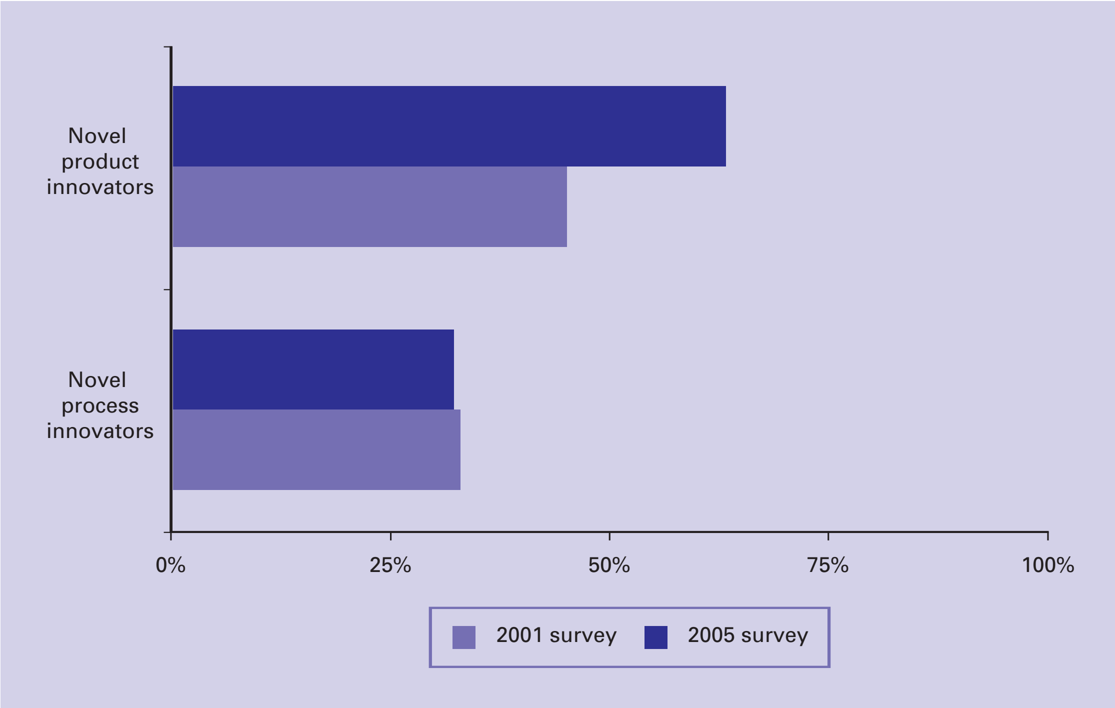
Figure 1.7: Percentage of new products to market/new processes to industry, product/process innovative enterprises only



- The regional view mirrors that of the sectoral breakdown seen previously. Within all regions over half of product innovators had introduced novel innovations within the period 2002-2004 and around a quarter of process innovations were novel.
- The share whose process innovators are new to the industry is highest in the North East Region.

Changes over time – 2001 and 2005 surveys

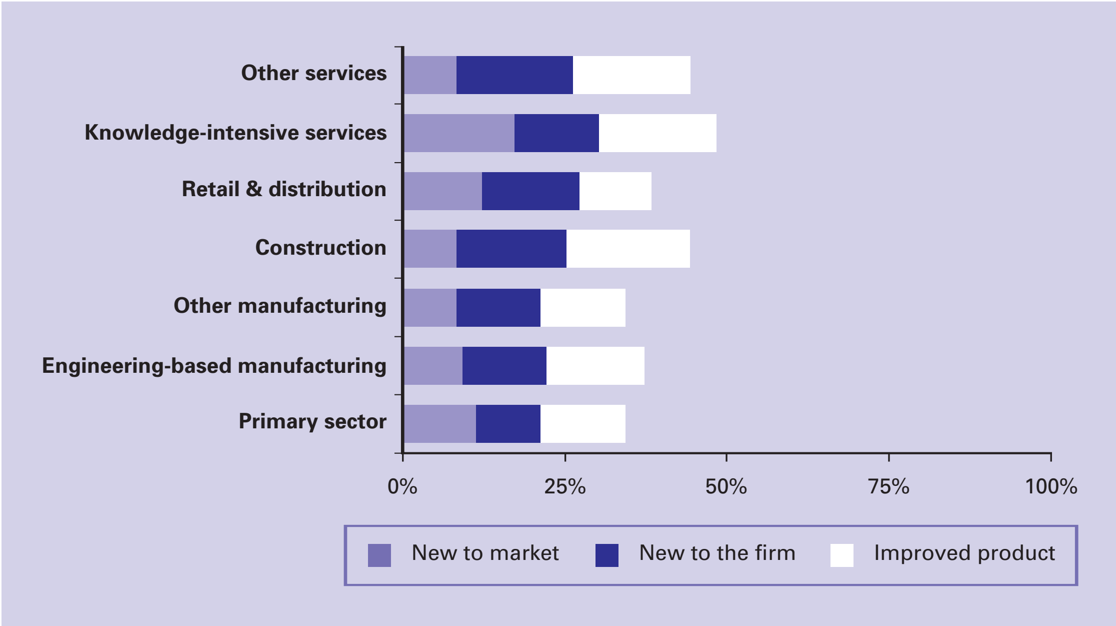
Figure 1.8: Novel innovators 2001 to 2005, product/process innovative enterprises only



- While the percentage of process innovators who introduced new processes to their industry remained constant, the percentage of product innovators who introduced new products to their market increased substantially.

The intensity of innovation can also be measured through the shares of business turnover due to different degrees of product innovation.

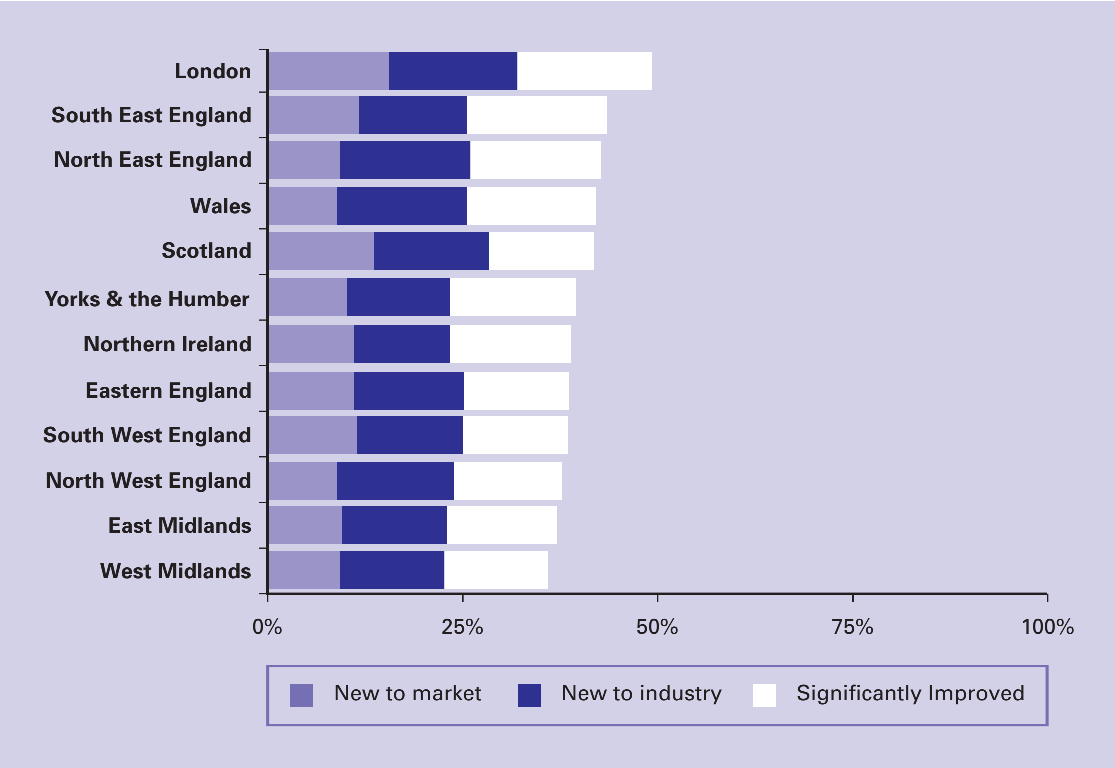
Figure 1.9: Distribution of turnover from product innovation, product innovators only



- Knowledge intensive services who were product innovators during 2002-04 benefited most from product innovation, making nearly half of their 2004 turnover from new or significantly improved products and over 17 per cent from new to market products.
- Quite surprisingly, the other sectors above the UK average of 41 per cent were Construction and Other services, sectors with lower shares of innovating enterprises.
- In most sectors, the improvement of products contributes a similar share of turnover to either new to the business or new to market products.

The regional dimension

Figure 1.10: Regional view: distribution of turnover from product innovation, product innovators only



- The London region, with a higher share of knowledge intensive services enterprises, recorded a considerably higher share of sales in new and improved products than other regions in the UK. Businesses in Scotland showed a relatively high share of sales from novel products.

Skills and Innovation

Apart from investment in research, knowledge, equipment and software, the skills and capabilities of staff and managers are a vital ingredient in successful innovation. They are the source of ideas and the main elements in the absorptive capacity, that enterprises need to engage effectively with external sources of knowledge about opportunities and technologies. In the survey, graduate level employment is taken as an indicator of innovation related skills in business. Table 1.4 shows the shares of the employees with degree level qualifications in Science and Engineering and other disciplines.

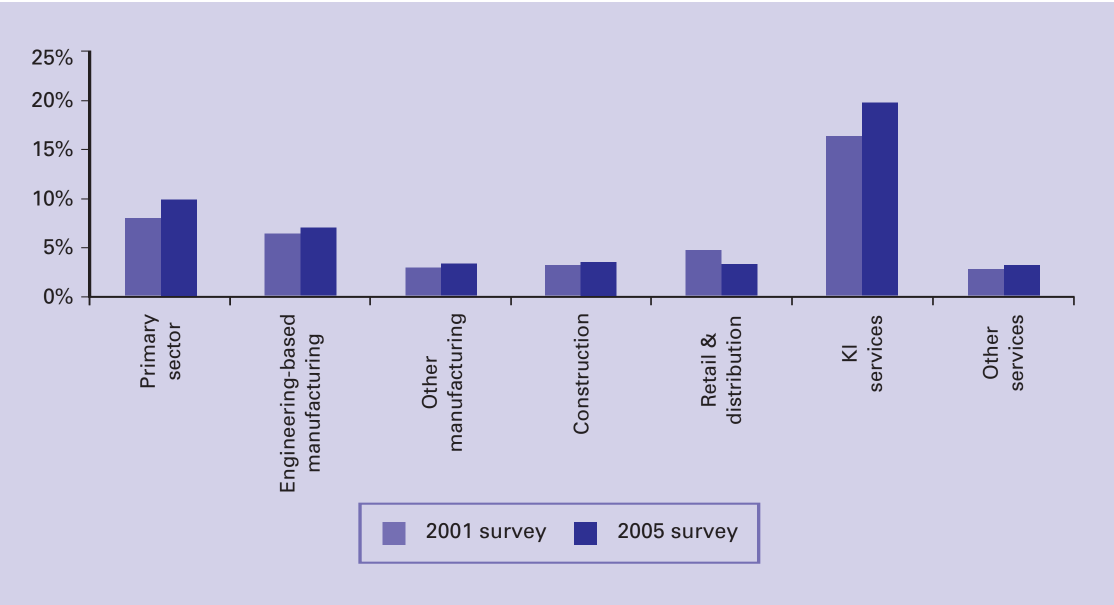
Table 1.4: Average percentage of employees educated to degree level

Per cent	Primary sector	Engineering -based manu-facturing	Other manu-facturing	Construction	Retail and distribution	Knowledge intensive services	Other services
Innovation active							
Science & Engineering	11	8	4	4	4	24	4
Others	7	4	6	6	7	20	10
Non-innovation active							
Science & Engineering	8	4	1	3	3	11	3
Others	6	1	5	2	3	14	5

- Innovative active enterprises have roughly twice the share of employees educated at degree level.
- Science and Engineering degrees are the larger shares in Primary and Engineering manufacturing and also, surprisingly, in knowledge intensive services, which also shows the highest overall share of graduate employment. Other manufacturing relatively specialises in other academic disciplines.

Changes over time – 2001 and 2005 surveys

Figure 1.11: Average percentage of employees educated to degree level in Science & Engineering subjects, all enterprises



- Most sectors recorded a slight increase over time in the proportion of employees with graduate level qualifications in science and engineering. Knowledge-intensive services, showed a significant increase in employees educated to degree level in Science and Engineering subjects.

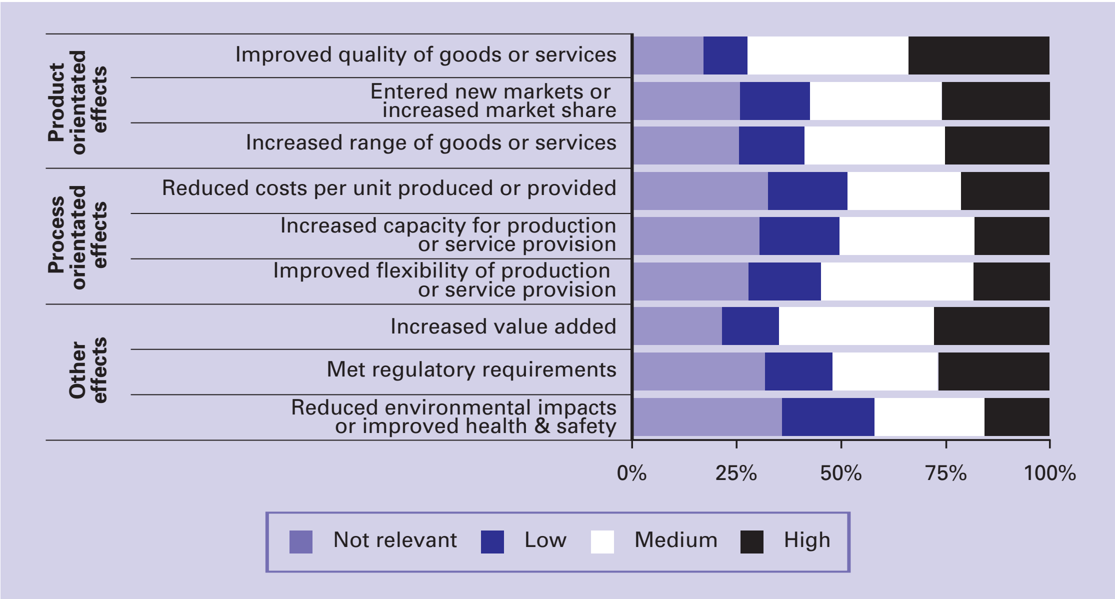
Effects of innovation

The need for and level of innovation for business enterprises derives from a variety of motives, including seeking competitive advantage or responding to competition, the need for efficiencies, improving customer satisfaction, or market re-positioning. The regulatory environment can also lead to a need for changes in products, processes or business practices. The survey investigates the ways that innovation affects the businesses themselves, both through financial indicators such as turnover impact, already covered above, and through a set of intermediate impacts.

Effects

Enterprises were asked to rate a number of effects from innovating on a scale from no impact, through low, medium, and high. Figure 1.12 summarises these responses for all innovation active enterprises.

Figure 1.12: Effects of innovation, innovative enterprises only



- Quality improvement of goods or services and increasing value added were most frequently cited, more so than expanding markets or increasing market share. This is consistent with the significant contribution to turnover from improved products.

- Innovation had least impact on reducing environmental impacts, improving health and safety and reducing costs per unit;
- Product orientated effects were significantly rated above process orientated effects.

There is some variation by broadly defined sector, set out in Table 1.5. Considering innovation active businesses only and taking just the share citing these effects as of "high importance".

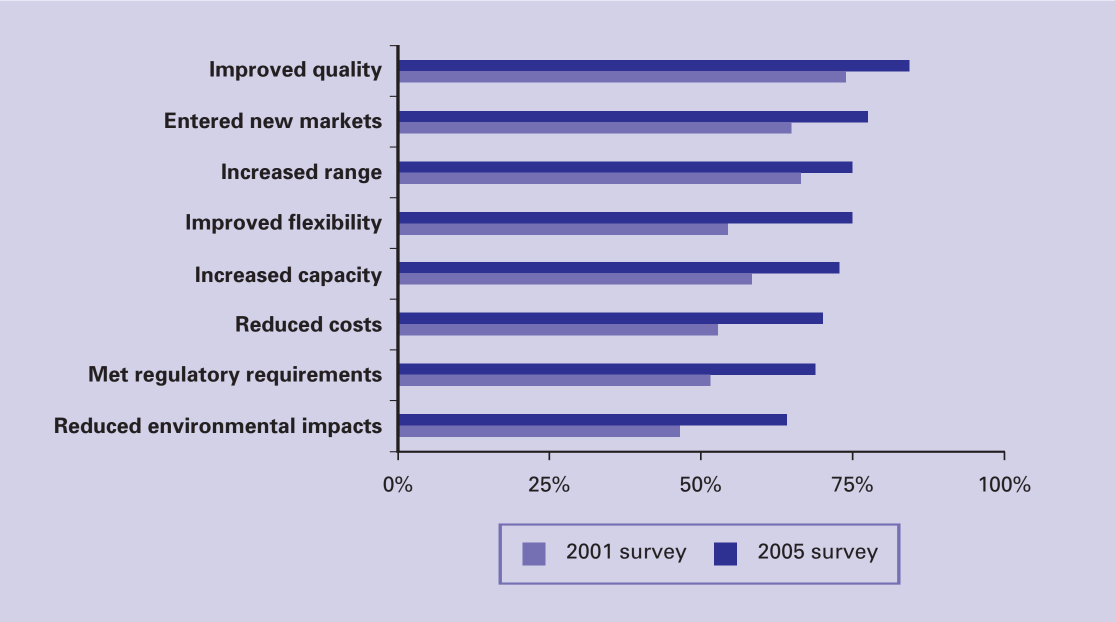
Table 1.5: Enterprises rating innovation effects as 'high' by sector

	Primary sector	Engineering-based manu-facturing	Other manu-facturing	Construction	Retail and distribution	Knowledge-intensive services	Other services
Product orientated effects							
Increased range of goods or services	14	27	27	11	31	27	21
Entered new markets or increased market share	22	29	28	17	26	31	21
Improved quality of goods or services	27	34	34	29	30	37	37
Process orientated effects							
Improved flexibility of production or service provision	15	22	24	17	13	19	17
Increased capacity for production or service provision	31	22	24	18	13	17	18
Reduced costs per unit produced or provided	29	30	31	18	20	17	17
Other effects							
Reduced environmental impacts or improved health & safety	37	17	20	30	14	9	16
Met regulatory requirements	37	26	23	36	23	27	31
Increased value added	31	29	29	21	24	32	28

- Overall, services and distribution are more product orientated while manufacturing and construction are more process orientated;
- Within the Primary Sector, unlike the other sectors of industry, other effects, including meeting regulations and amending environmental impacts, are considerably more often cited than product and process orientated effects.

Changes over time – 2001 and 2005 surveys

Figure 1.13: Relevant effects of innovation, innovative enterprises only



- On average, enterprises benefited significantly more in 2005 from their innovation activity than in 2001 in all categories.
- These figures demonstrate that innovation activity primarily focused on one product or service has spillover effects in a business. For example, although only 16 per cent of enterprises were process innovators, 75 per cent of innovative enterprises improved their flexibility of production or service provision.

Wider innovation

This section has so far brought out the findings of the survey on product and process innovation and the investments in research and knowledge application that enable them. It has long been accepted amongst analysts however, as well as by business people engaged in the marketplace, that wider domains of innovation activity are essential for these traditional modes of innovation to be effective and profitable. Amendments to management practices, business strategies or organization can also be the main mode of innovation, where market conditions do not require product or process change. These domains of changing the business include management techniques, organizational restructuring and approaches to the market place. The innovation surveys run by the DTI in 2001 and 2005 have included lines of questioning around these important topics and this section brings out some of the results (mainly from the recent survey).

The following paragraphs report the basic facts about innovation through organizational and management change, taken as distinct forms and also in conjunction with other forms of innovation directed activities and outcomes.

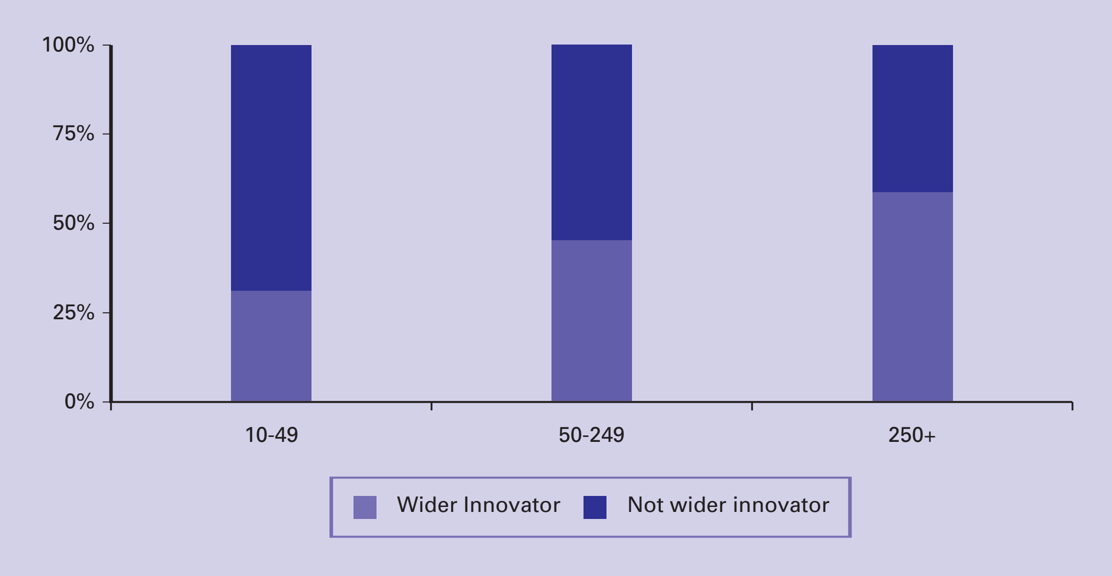
Organisation, management and marketing: strategic changes

The majority of research studies on innovation have emphasised technological change and how it is manifest in products and production processes (Salter & Tether, 2006). This reflects theories of innovation that have themselves been technology and manufacturing industry focussed. The importance of service providing sectors in the economy and increasing awareness of the role of business processes and organisation for efficiency and meeting customer requirements has led to new awareness of how change can be effected through these broadly managerial forms distinct from or in combination with technologically based innovation.

A section of the innovation survey questionnaire seeks to identify the number of businesses that have undertaken distinct and significant changes in pursuit of competitive advantage, under the heads of Organisation, Advanced Management Techniques, and Marketing strategy. Overall, 33 per cent of businesses adopted one or more such changes during 2002 -2004.

As expected, the share of wider innovators increase with business unit size, with nearly 60 per cent of large firms reporting one or more types.

Figure 1.14: Wider innovation by business size



- Around 50 per cent of employment is in business units with one or more forms of wider innovation.

The shares of businesses adopting the four forms of wider innovation are summarised in Table 1.6.

Table 1.6: Types of wider innovations, percentage of all enterprises

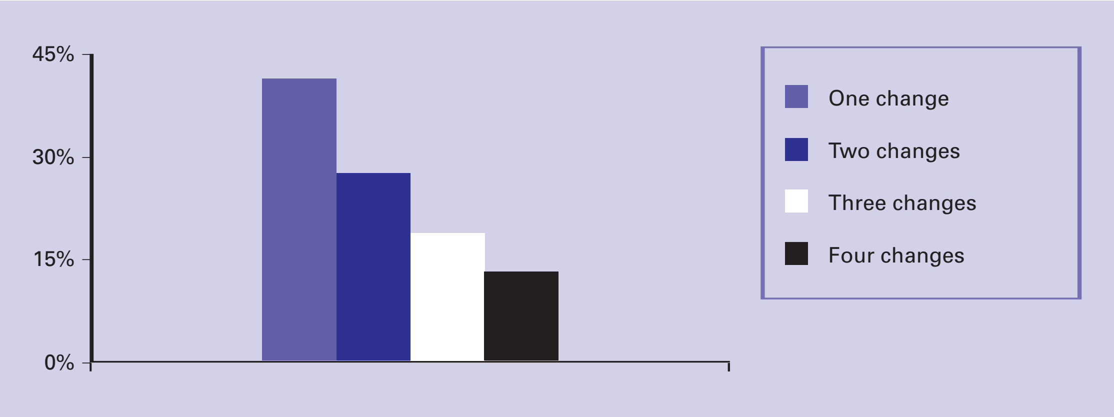
All sectors	All 10+	10-49	50-249	250+
All forms	33	30	45	58
Corporate strategy	17	15	23	30
Management	14	12	20	29
Organisational Structure	17	15	26	39
Marketing	20	18	26	35

- It is striking that all types occur with fairly similar frequencies. That is, a fashion for one form of managerial change does not predominate.
- For the sample as a whole, a change in marketing strategy is more frequently cited, but for larger firms, revision to the organisational structure is a little more likely to occur.
- Introducing advanced management techniques, which are more likely to be codified in published guides to best practice is marginally the least cited.

Intensity of managerial change

It is clear from the above that firms often combine forms of wider innovation and a simple indicator of the intensity of managerial change is a count of the number of types adopted and the combinations that are favoured. Figure 1.15 shows the count measure, based on those with some form of wider innovation.

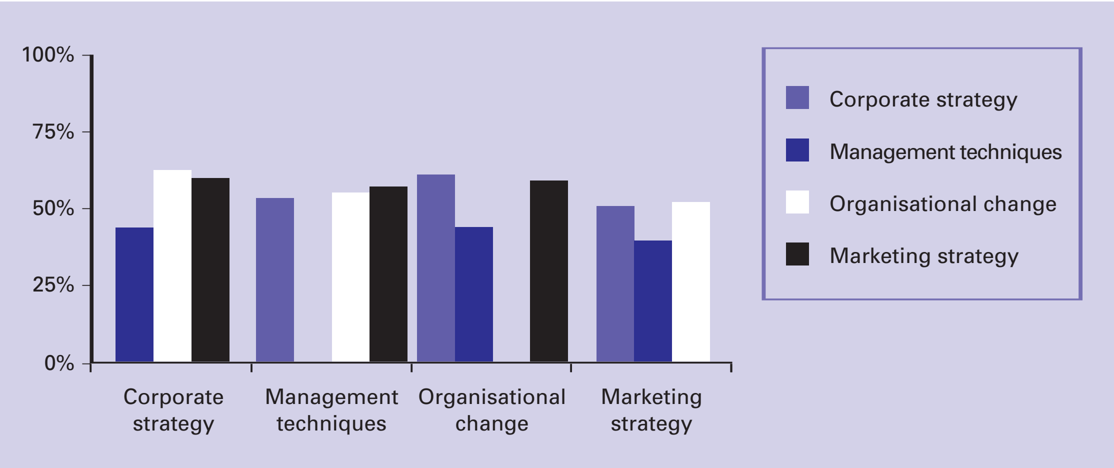
Figure 1.15: Number of wider innovations, wider innovators only



- For the one third of businesses with management type innovations, these tended to be pervasive and extensive rather than piecemeal.
- Of those with some management change, 41 per cent had one form only. The majority brought about two or more while over 13 per cent introduced all four types.

Some of the combinations of types of managerial changes are summarised in Figure 1.16 below:

Figure 1.16: Wider innovation combinations, wider innovators only



- Over 60 per cent of those with a change in corporate strategy also made changes in the organisation or in marketing strategy.

Linkages in the system

A fruitful way of thinking about the economics of innovation is in terms of a national system, where innovators and the external environment, including other enterprises, institutions and the business infrastructure are linked by flows of knowledge or by collaboration in research or other forms of joint innovation. Much analysis has pointed to the effectiveness of the collaborative mode in achieving innovation objectives where conditions, and the absorptive capacity of the businesses involved are appropriate. Chapter 1 in Section 2 has a more in depth analysis of one of the vital relationships in a modern economy, that between innovating enterprises and the public research base. Here we review the results on the broader patterns of information flows and collaborative arrangements.

Sources of information

A wide variety of sources of information were included in the survey form and most were quite widely accessed by enterprises. Table 1.7 shows the shares of innovation active enterprises who attached degrees of importance to the different types of source. In common with the results of previous surveys, commercial sources of information were recorded by more businesses than were institutional or specialized providers. The final column of Table 1.7 records the share who reported some degree of interaction.

Table 1.7: Importance of information sources, innovative enterprises only

Per cent	Not used	Low	Medium	High	Some use
Own enterprise or group	**19**	14	33	34	81
Suppliers	**14**	22	42	22	86
Customers	**13**	16	33	38	87
Competitors	**22**	30	35	14	78
Consultants or private labs	**51**	29	16	4	49
Universities or other HEIs	**71**	19	8	2	29
Govt or public research institutes	**69**	21	8	2	31
Industry conferences or fairs	**35**	31	26	8	65
Scientific or trade Publications	**36**	32	26	5	64
Trade Associations	**33**	32	28	7	67
Technical, industry or service standards	**36**	27	27	10	64

A similar pattern of external information sourcing applies to the share of innovation active enterprises who were product or process innovators during the survey period.

The regional dimension

Table 1.8 below shows enterprises making some use of sources broken down by region.

Table 1.8: Source of information for innovation, by region innovation active firms only

Per cent	North East England	North West England	Yorks & the Humber	East Midlands	West Midlands	Eastern England	London	South East England	South West England	Wales	Scotland	Northern Ireland
within your enterprise or enterprise group	80	80	82	81	80	82	84	82	81	78	80	79
Suppliers	86	86	86	88	84	88	84	87	87	86	87	88
Clients or customers	84	84	88	87	86	86	87	87	89	85	89	86
Competitors	76	75	80	78	76	76	79	80	81	77	81	80
Consultants or private labs	47	45	47	49	48	47	55	49	46	49	52	50
Universities or other HEIs	34	28	27	33	28	26	28	28	26	35	34	36
Govt or public research institutes	31	28	29	30	29	27	31	31	28	34	37	39
Conferences, trade fairs, exhibitions	57	62	65	66	61	66	67	67	63	62	70	67
Scientific, trade & technical publications	59	60	61	67	64	65	64	64	65	61	68	63
Professional and industry associations	62	65	65	66	63	65	69	68	72	60	70	66
Technical, industry or service standards	61	64	63	66	64	65	63	65	67	60	67	64

Changes over time – 2001 and 2005 surveys

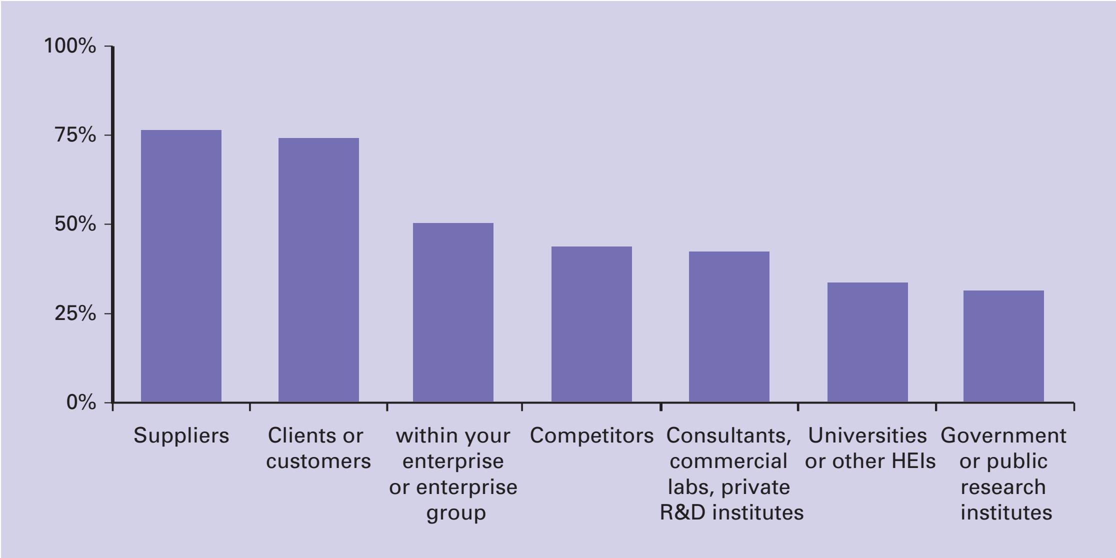
Figure 1.17: Source of information, all enterprises

- Engagement with all sources of information have increased, especially with those in the commercial sector.

Cooperation

Cooperation arrangements to enable innovation are an important aspect of the innovation system and have high policy priority because of accumulated evidence of the benefits that flow from sharing knowledge. The extent to which enterprises cooperate with other enterprises and with the more specialised technology generators, such as the public research base emerges from the survey. Some 13 per cent of enterprises report cooperation arrangements. Figure 1.18, shows the shares of cooperating enterprises who cooperate with various partners.

Figure 1.18: Cooperating enterprises' partners, cooperative enterprises only



- Enterprises collaborate more with their suppliers and their customers, than with specialist intermediaries and the research base, although taken together these are a major source of partners for innovation.
- Half of all enterprises with cooperation agreements collaborate within their enterprise or enterprise group.
- Both novel and follower product and process innovators collaborated at similar levels with external partners. However, the share of novel innovators collaborating with Universities was considerably higher.

The regional dimension

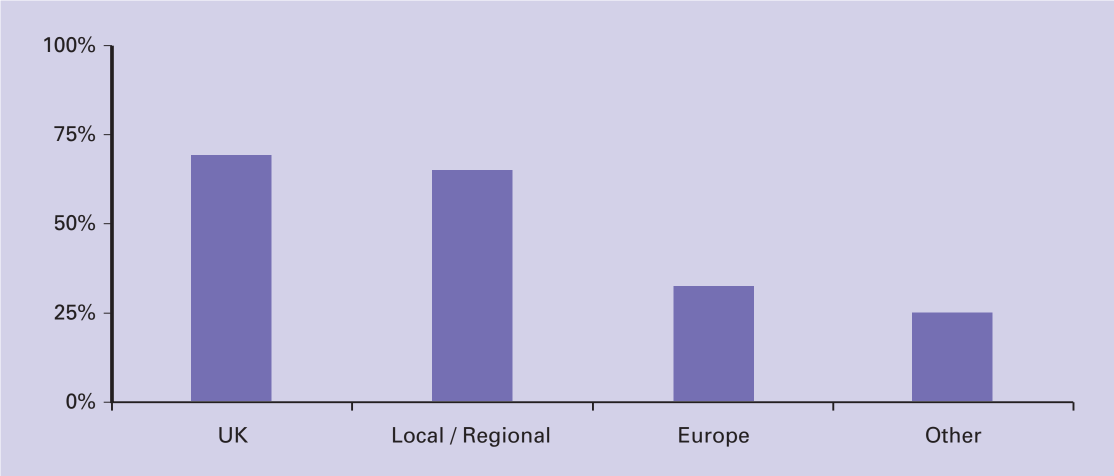
Table 1.9: Regional breakdown of partners, cooperative enterprises only

Per cent	North East England	North West England	Yorks & the Humber	East Midlands	West Midlands	Eastern England
within your enterprise or enterprise group	61	46	41	48	45	57
Suppliers	77	64	83	74	77	77
Clients or customers	74	77	78	76	74	76
Competitors	50	42	45	47	38	45
Consultants, commercial labs, private R&D institutes	44	36	35	37	40	46
Universities or other HEIs	53	36	30	32	33	30
Government or public research institutes	30	31	27	25	30	27

Per cent	London	South East England	South West England	Wales	Scotland	Northern Ireland
within your enterprise or enterprise group	56	53	44	44	51	47
Suppliers	81	72	85	74	71	78
Clients or customers	72	67	77	71	74	71
Competitors	41	41	47	47	50	46
Consultants, commercial labs, private R&D institutes	52	40	44	47	41	40
Universities or other HEIs	32	25	40	41	43	36
Government or public research institutes	35	26	37	32	37	38

- Some regional variability exists in cooperating with HEIs and government labs.

Figure 1.19: Geographical distribution of enterprise partners, cooperative enterprises only



- More enterprises cooperate with partners situated in the UK, including local and regional partners.

The regional dimension

Table 1.10: Geographical distribution of firms' partners by region, cooperative enterprises only

Per cent	North East England	North West England	Yorks & the Humber	East Midlands	West Midlands	Eastern England
Local/Regional	71	63	67	61	74	64
UK	71	68	67	79	66	71
Europe	22	23	22	32	33	43
Other	22	19	18	20	24	34

Per cent	London	South East England	South West England	Wales	Scotland	Northern Ireland
Local/Regional	60	58	64	63	77	85
UK	70	72	61	65	68	51
Europe	39	35	30	22	36	35
Other	35	27	24	16	22	17

- Business in London, South East and the East of England are relatively likely to find overseas partners.

SECTION 2. INSIGHTS

1 Universities and Business Innovation

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The UK Innovation Survey 2005 is a very useful tool for those who wish to explore the connections between university research and business innovation. As the 2005 survey contains such a large number of questions, it allows us to examine a wide variety of possible linkages. Within one cross-section, of course, it is hard (or perhaps impossible) to establish causal connections. Nevertheless, some of my explorations, reported below, suggest connections that are not well understood and are worthy of further research.

In George Shackle's theory, the entrepreneur is one who enjoys exploring whether there is anything to be found in hitherto neglected combinations (Earl, 2003 and Swann, 2006) It is that 'exploratory spirit' which motivates this short paper. In what follows, we make use of simple statistical analysis, rather than any complex econometric models, but this simple analysis is appropriate for the immediate task in hand.

Business-University Collaboration and the Effects of Innovation

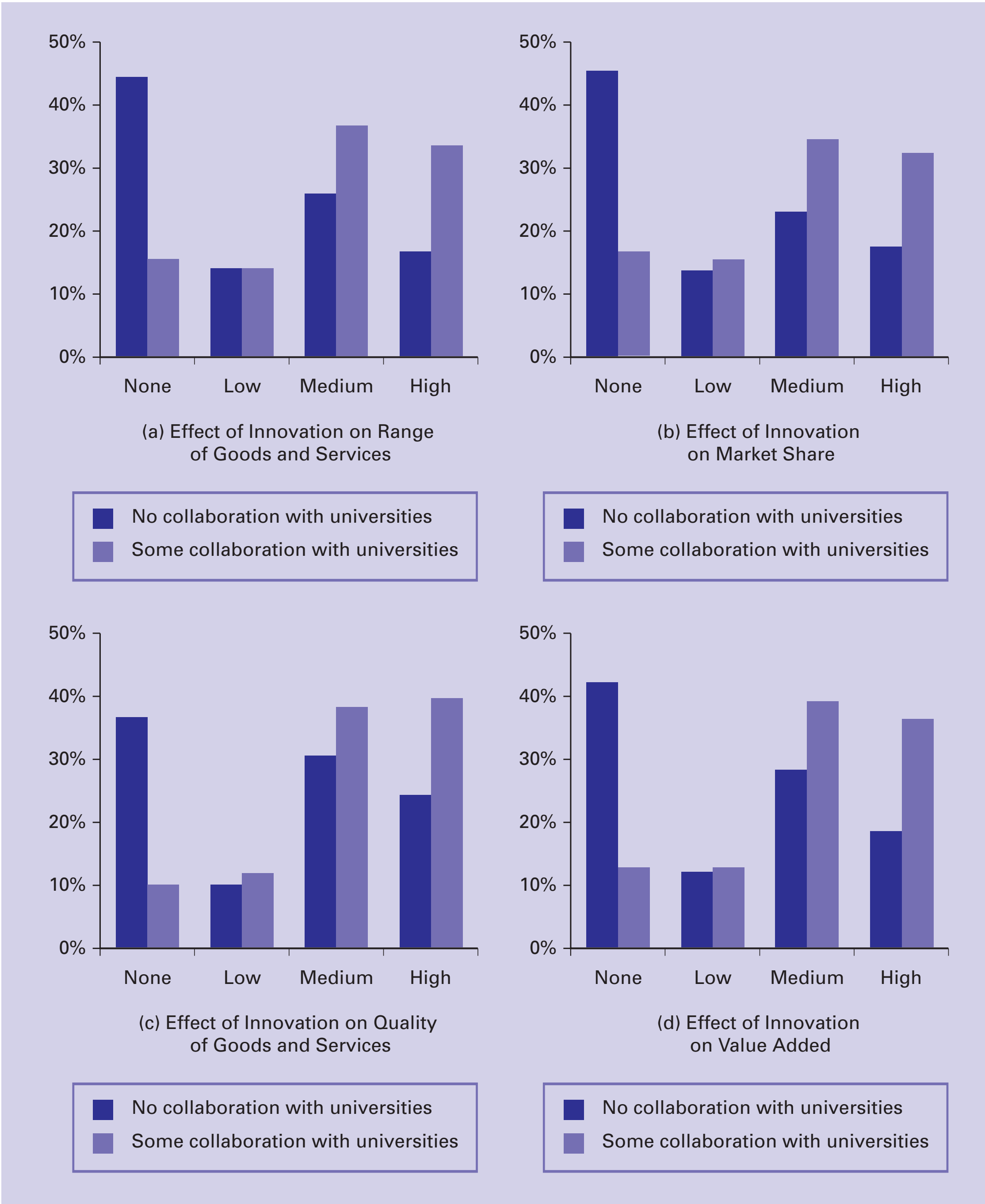
It is well documented that only a relatively small proportion of companies collaborate directly with universities. In the 2005 survey, this proportion is under five per cent. But even if the proportion is small, do those companies engaged in collaboration with a university have better performance than others? And if so, in what way does this better performance manifest itself?

The 2005 survey contains a series of questions about the effects of innovation on the following aspects of performance:

- Increased range of goods or services
- Entered new markets or increased market share
- Improved quality of goods or services
- Increased value added
- Increased capacity for production or service provision
- Improved flexibility of production or service provision
- Reduced costs per unit produced or provided
- Reduced environmental impacts or improved health and safety
- Meeting regulatory requirements

In each case, the respondent can reply that the effect was: ‘none’, ‘low’, ‘medium’ or ‘high’. We can compare the responses amongst those enterprises that do collaborate with universities and those who do not. Figure 2.1.1 shows the pattern of responses for the first four of the effects listed above.

Figure 2.1.1: Effects of Innovation and Business-University Collaboration



In each case, a large proportion of those who *do not* collaborate with Universities say that innovation has ‘no effect’, while the second most common response is ‘medium effect’. By comparison, the distribution of responses amongst those who *do* collaborate with universities is located further to the right. In all cases, the proportion of ‘medium’ or ‘high’ responses is higher amongst those who collaborate with universities than amongst those who do not. The pattern for the other five effects listed above is similar, but not quite so pronounced.

In short, the probability that innovation has a ‘medium’ or ‘high’ effect on these four measures of performance is greater amongst those that collaborate with universities. However, this regularity does not tell us whether the collaboration in itself enhances the effect of innovation, whether these stronger effects encourage firms to seek collaboration, or indeed whether the mechanism underlying the correlation is more complex still. However, it is suggestive of a benefit that may flow from business-university collaboration.

The Effects of Innovation and the Geographical Pattern of Collaboration

The 2005 survey probes further into business-university collaboration by asking whether the respondent’s company collaborates with: (a) its local or regional university; (b) another university in the UK; (c) a university elsewhere in Europe; and/or (d) one in some other country. What association, if any, can we find between the effects of innovation and this geographical pattern of collaboration?

There is no obvious single statistic to summarise each of the graphs in Figure 2.1.1. Nevertheless, a natural measure to compare the distributions of responses for those who collaborate, and those who do not, is the relative (conditional) probability ratio:

$$\frac{\Pr\,(\text{High Effect} \mid \text{Some Collaboration with Universities})}{\Pr\,(\text{High Effect} \mid \text{No Collaboration with Universities})} \tag{1}$$

This is the ratio of the conditional probability of a ‘high effect’ amongst those that *do* collaborate with universities to the conditional probability of a ‘high effect’ amongst those that *do not* collaborate with universities. In Figure 2.1.1, this is the ratio of the light blue bar to the dark blue bar for the right-most entry in each graph, and the values for graphs (a), (b), (c) and (d) are 2.0, 1.9, 1.7 and 1.9 respectively.

Figure 2.1.2: Effects of Innovation and Geographical Pattern of Collaboration

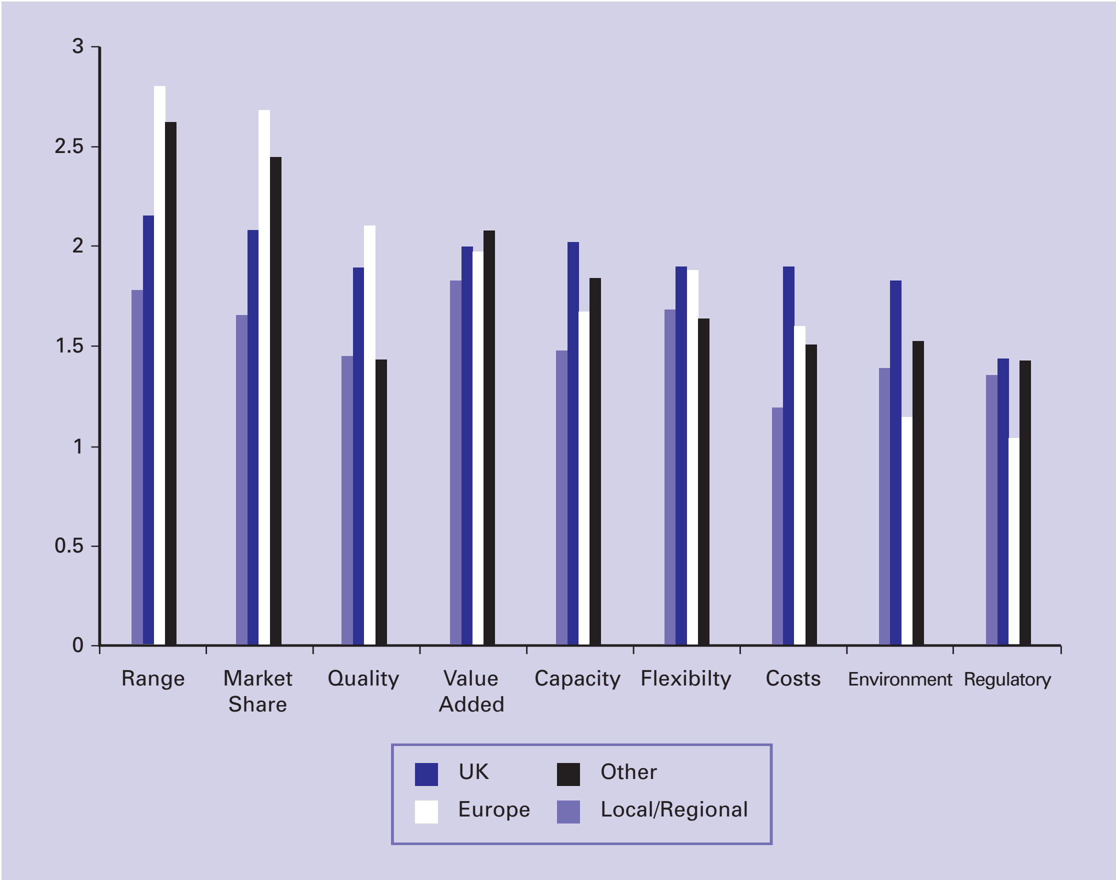


Figure 2.1.2 shows this relative probability ratio for each effect of innovation and for the different geographical focus of business-university collaboration. What does it tell us? For the first two innovation effects towards the left hand side of the graph (range of goods and services, and market share), we see that these relative probability ratios can be quite large – and especially so for those companies who collaborate with universities in Europe or elsewhere in the world. By contrast, for the five innovation effects towards the right of the graph (increased capacity, improved flexibility, reduced costs, reduced environmental impacts, and regulatory effects), these relative probability ratios are somewhat smaller – and here the highest ratios are for those companies who collaborate with UK universities.

In short, the effects of innovation on range, market share and quality are greatest for those who collaborate with universities in Europe. By contrast, the effects of innovation on capacity, costs and environmental impacts are greatest for those who collaborate with UK universities. And in general, the effects of innovation on these performance measures are weaker amongst those companies that collaborate with local or regional universities.

These results make some intuitive sense. International collaboration is likely to expose the company to the most exciting scientific advances, but for certain purposes collaboration with a UK university is more effective – perhaps because the transactions costs of co-operation at a distance and across national boundaries can be substantial.

Business-University Collaboration and the Value of Information

In addition to exploring the extent of business-university collaboration, the 2005 survey asks companies about the value of different information sources in supporting their innovation activities. Respondents are asked about the importance of eleven sources of information, and can answer, 'none', 'low', 'medium', 'high'. The proportion who attach some value to information obtained directly from universities is fairly small (about 20 per cent). That makes the university one of the least important direct sources of information identified in the 2005 survey. But even if this proportion is small, it is useful to find out what we can about the companies that do attach value to information from Universities.

Figure 2.1.3: Business-University Collaboration and Value of Information Sources

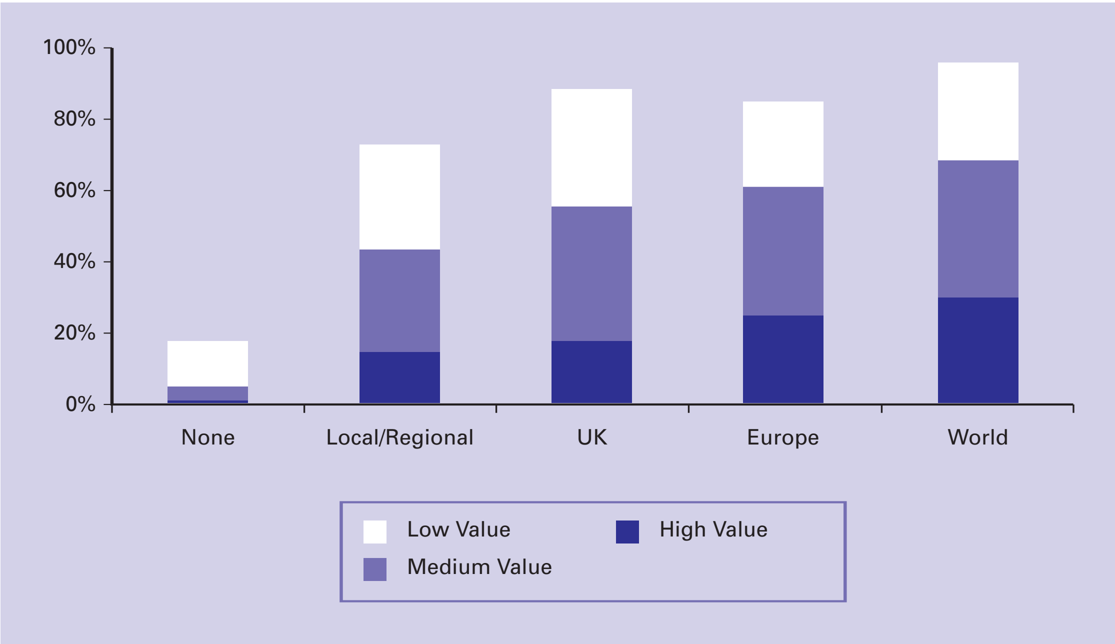


Figure 2.1.3 shows the proportion of company respondents who attach some value ('low', 'medium' or 'high') to information from universities, and shows how these proportions vary according to whether companies collaborate with universities and where these are located. The left hand bar shows these proportions for those who do not collaborate, and the subsequent bars refer to companies who have local/ regional, UK,

European and world collaborations. The first point to note is that a far higher proportion of those who collaborate with universities find information from universities of value to their innovation activities. Indeed, we would hope so, for otherwise, why are they collaborating with universities to help their innovation activities?

Less obvious, but still important are the differences in response according to the geographical pattern of business-university collaboration. For those companies that collaborate with a local or regional university, the university is a less important source of information than it is for those who collaborate with world universities. Again, these results make some intuitive sense. International collaboration exposes the firm to the most exciting scientific advance and information of high value for the firm's innovation activities. Collaboration with a local or regional university, by contrast, is less likely to expose the firm to quite so much leading-edge information.

Complementarities between Universities and other sources of information

Finally, the 2005 survey allows us to go beyond the simple measures of how companies value different sources of information, and explore the complementarities between different sources of information. For example, if a company values the university as a source of information, what other sources will it value?

We can define complementarities as follows. For any company we can define its information sources as the set I. This set can contain one or more of the following list:

- Within enterprise or enterprise group
- Suppliers
- Clients or customers
- Competitors or other enterprises in industry
- Consultants, commercial labs or private R&D institutes
- Universities or other HEIs
- Government or public research institutes
- Conferences, trade fairs, exhibitions
- Scientific journals and trade/technical publications
- Professional and industry associations
- Technical, industry or service standards

The set ***I*** is the set of information sources which are given at least a 'low' value. For each pair of information sources (j and k) we can define:

$p_{jk} = pr\ \{j\varepsilon I \mid \text{and } k\varepsilon I \mid j\varepsilon I \text{ or } k\varepsilon I\}$

This is the (conditional) probability that ***I*** contains *both* sources j and k – conditional on it containing *one or other (or both)*. If p_{jk} is large (between 0.5 and 1), we can say that j and k are *complements*: if a company uses one as a source of information it is likely to use *both*. But if p_{jk} is small (between 0 and 0.5), we can say that j and k are *substitutes*: if a company uses one as a source of information it is *not* likely to use the other.

Table 2.1.1 (opposite) presents estimates of these conditional probabilities. The matrix is symmetric, so we only report the lower triangle.

Suppliers, clients, competitors and within group information sources form a strong complementary group. If a company uses one of these information sources it is very likely to use others. Indeed, for the clear majority of elements in the matrix (35 out of 55), the conditional probabilities are 0.5 or above – meaning that the pairs of sources corresponding to these elements are more likely to be complements than substitutes.

The most striking exceptions are those involving government/public research institutes, or universities. The conditional probabilities for the university are, with one exception, all below 0.5. This means that use of the university as an information source is not complementary to use of most other sources. The one exception is that universities and government/public research institutes are complementary sources of information: if a company uses one of these sources, then it is likely to use the other.

Some have suggested that we would expect universities and scientific journals to be complementary sources of information, but the table suggests that they are not. The table shows that the use of journals as an information source is complementary to most other information sources – except government/public research institutes and universities. This last observation may seem surprising. It suggests that, as an information source, journal articles play a rather different role from the universities whose academics write those journal articles.

Conclusion

These brief explorations only scratch the surface of what can be done with the 2005 survey. There are many other possible linkages to be explored. A longer paper based on this work will be available later in 2006, and this will illustrate some of the other linkages of interest.

Table 2.1.1: Complementarities amongst Information Sources

	Within	Suppliers	Clients	Competitors	Consultants	Universities	Government	Conferences	Journals	Associations	Standards
Within Group	100										
Suppliers	80	100									
Clients	80	85	100								
Competitors	76	78	84	100							
Consultants	52	51	49	53	100						
Universities	32	30	30	31	46	100					
Government	34	32	32	34	46	61	100				
Conferences	63	64	65	65	49	36	39	100			
Journals	61	64	63	62	51	37	39	68	100		
Industry Associations	65	67	67	67	52	36	40	64	70	100	
Standards	64	66	65	66	55	37	40	63	68	76	100

2 Design in innovation and the Creative Industries

This chapter considers initially modes of innovation, investigating the role of design within innovation, and then takes a brief look at the creative economy. Comparisons are made between creative enterprises and other industries identifying some significant differences in innovation levels and firm behaviour.

Modes of Innovation – the role of design

Broad Innovation

Much interest has developed in recent years in innovation policy and research circles in broadening the concepts of innovation to encompass more than the generation and use of new technology. One dimension of this is the idea of the "knowledge based" or "knowledge driven" economy. This implies the importance of codified knowledge including but not restricted to formal research and knowledge in the heads of people.

R&D has been the subject of intense policy focus and the Ten year Framework for Science and Innovation Investment sets an ambitious aim of achieving two-and-a-half per cent of UK GDP devoted to R&D. The importance of R&D is partially derived from evidence from economic studies of externalities or spill-over of knowledge from both private and publicly funded research, into the economic activities of other firms. The ability to make effective use of knowledge either generated within the organisation or available via spill-over mechanisms such as scientific publication, needs complementary assets and skills. And from a national economy perspective, the right levels of these assets are needed in order to internalise the externalities. One of these is investment in design, which plays a role in product and process development and adaptations, as well as in marketing.

This section presents some analysis of the innovation survey data looking at the role of design in modes of innovation activity. The builds on and extends a recent major study of the importance that design and creativity have in the modern UK economy, published as a DTI Economics Paper (DTI Economics Paper No.15, 2005).

Investment for Innovation

The UK unlike most countries who carry out innovation surveys, separates out design from other investments for innovation. Design spending is about five per cent of the total of innovation directed business spending (see Figure 1.3), a higher share than external knowledge acquisition, but considerably lower than the shares of R&D, capital expenditure and marketing. Design investment can then be linked directly to product and process innovation and to design related Intellectual Property measures, to derive indicators of the extent of design based innovation and whether this mode has systemic characteristics distinct from innovation based on technology.

A related question is the extent of interaction between design and other inputs. That is, are there firms or industries where design investment is a complement to, say, R&D, or where it plays a more fundamental role as the creative source for innovation? The analysis here is confined to the interface between design and technology determinants of innovation, which can be seen as the creative mechanisms.

The analysis includes the roles of technology and design in innovation in service provision. It is possible to take a very narrow view of the design functions – the skills, routines, habits, guides and personal creativity, as having economic applications only to appearances of goods. But a recent survey of the design industry for the UK's Design Council [Design Council, 2005] identified a wide range of design markets and specialist suppliers, including the design of services. This can include of course premises – shops, offices and so on, but also the full ranges of interfaces required for effective service provision. The need for a satisfying customer experience is not confined to the retail sector. And of course website design is what differentiates suppliers – the technology behind Ecommerce is commoditised.

Design and technology indicators

The survey records design as an input, but, like others, collects information on design related IP – the importance of design registration and of complexity of design. These can be used to define a "design using" approach to innovation. In a similar vein, a subset of firms engages in R&D activity, intra or extra-mural and assigns some importance to patents to protect their innovations. This can be defined as a "technology led" mode. Of course, there is a substantial overlap between the two sets of firms. The majority of technology led innovators are also design users, often as a complementary investment, to translate R&D results into new and improved products and processes. The mode can be defined as "design inclusive". Table 2.2.1 shows the shares of UK businesses who adopt the three modes.

Table 2.2.1: Design and technology, percentage of all enterprises

Per cent		Design users No	Design users Yes	Total
Technology led	No	58	8	66
	Yes	9	26	34
Total		67	33	100

These modes are defined excluding other types of input in order to focus on the formal creative sources of innovation and to bring out the role of design as an innovation generating investment.

Modes and Outcomes

Figure 2.2.1 shows how various forms of innovation fall between the modes. The design inclusive approach is more common across all the levels shown here, but more so in the case of innovation in goods. There are significant shares of businesses in all innovation categories who specialise in technology or in design as the internal creative driving force for their innovations.

Figure 2.2.1: Modes of innovation

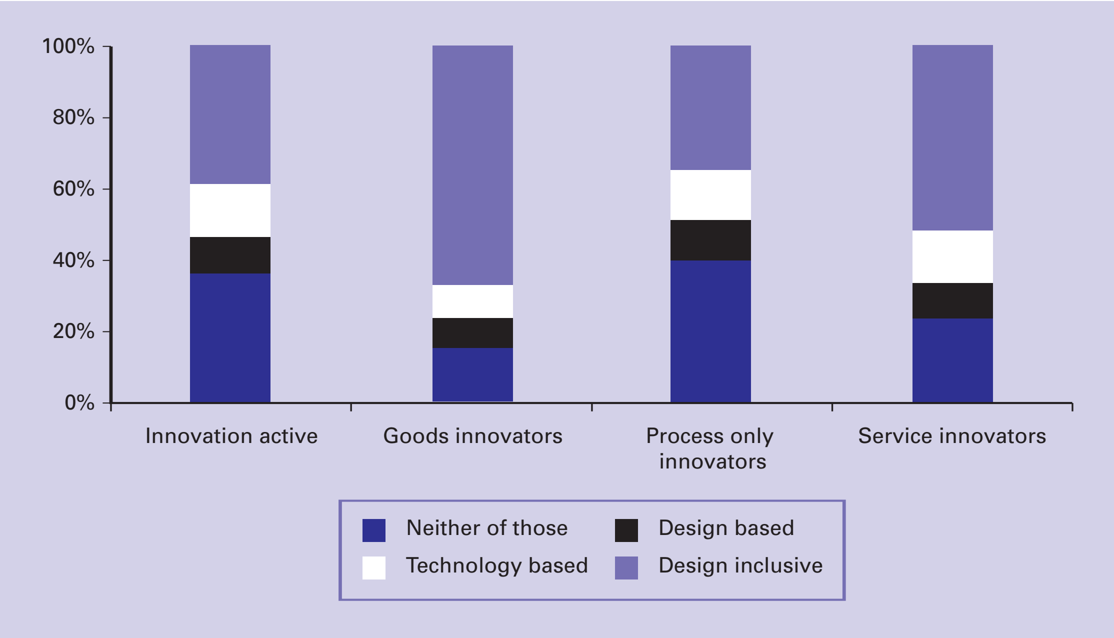
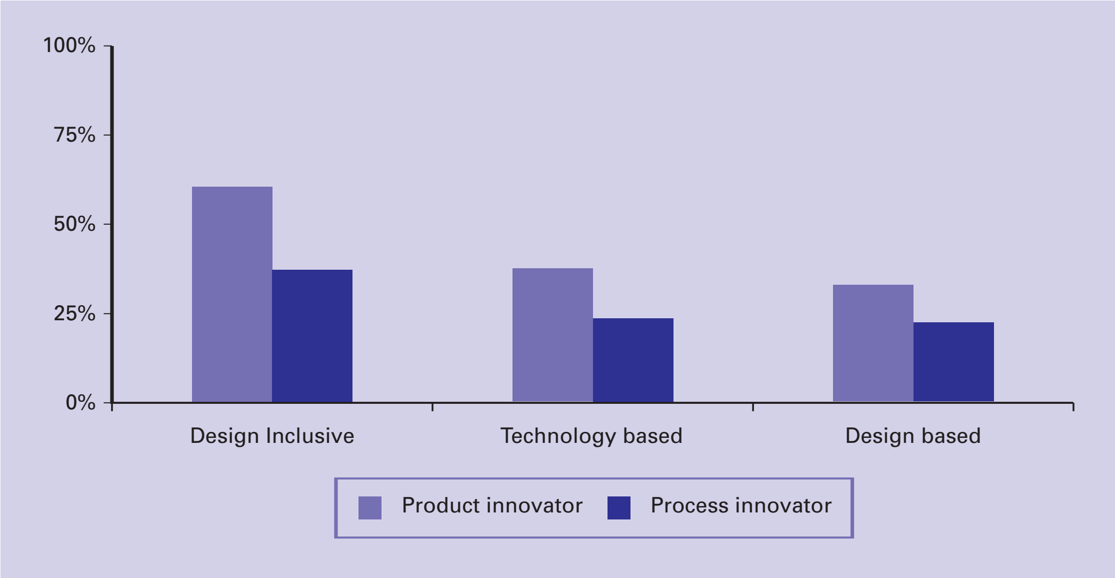


Figure 2.2.2 shows the propensity to product and process innovation by the three modes. This analysis indicates again that the design inclusive mode, with complementary technological and design related investment, is associated with higher propensities to innovate contemporaneously than basing creative inputs on technology or design solely. There is though little difference between innovation propensities between the latter modes.

Figure 2.2.2: Innovation propensities within modes



- Design based or design inclusive modes of innovation play a significant and distinctive role.
- Complementary investment in technology and design together are consistent with higher levels of final innovation outcomes.

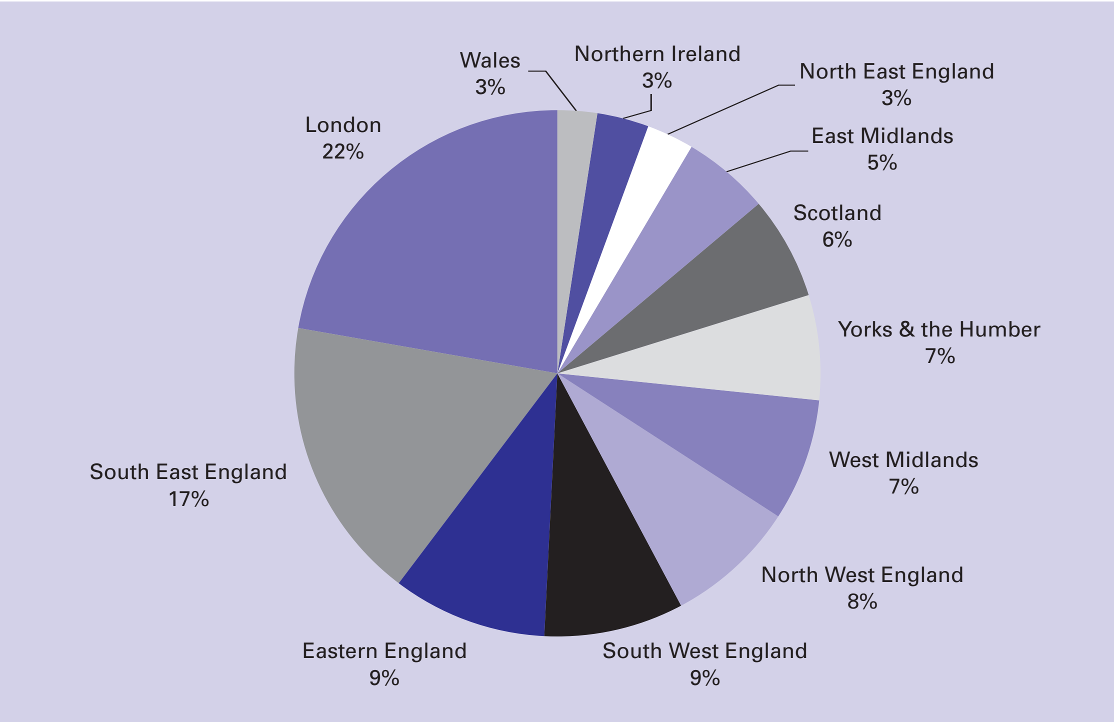
The Creative industries

Introduction

Other aspects of the role of creativity in the economy are manifested in the creative industries.

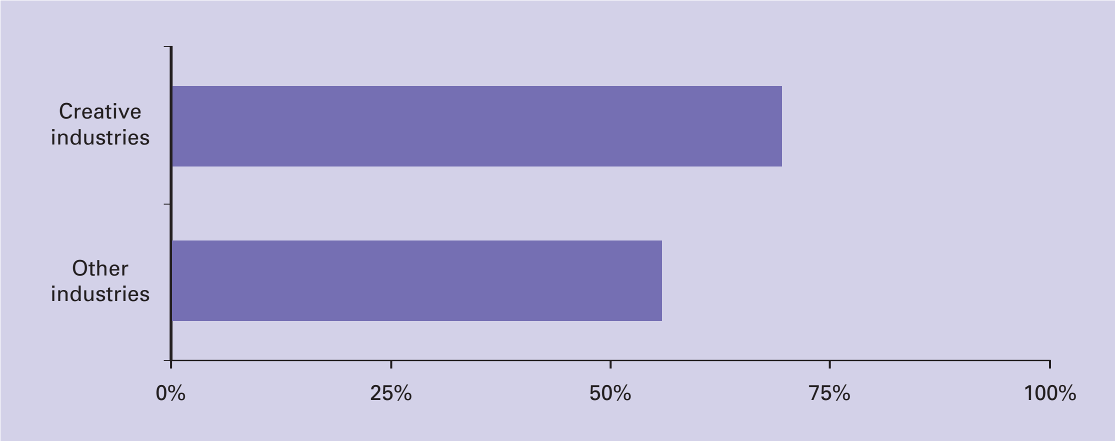
The Department for Culture, Media and Sport defines the creative industries as those which have their origin in individual creativity, skill and talent and which have a potential for wealth and job creation through the generation and exploitation of intellectual property. The 2005 survey sampled around two thirds of these sectors which includes advertising, architecture, the art and antiques market, crafts, designer fashion, interactive leisure software, publishing, software and computer games and some of the sectors within film and video, music, the performing arts, television and radio. Figure 2.2.3 below shows the geographical location of these enterprises.

Figure 2.2.3: Geographical distribution of creative industries



Forty per cent of these enterprises are based in London and the South East and, as expected, on average these businesses are significantly more innovative than UK enterprises on the whole (Figure 2.2.4).

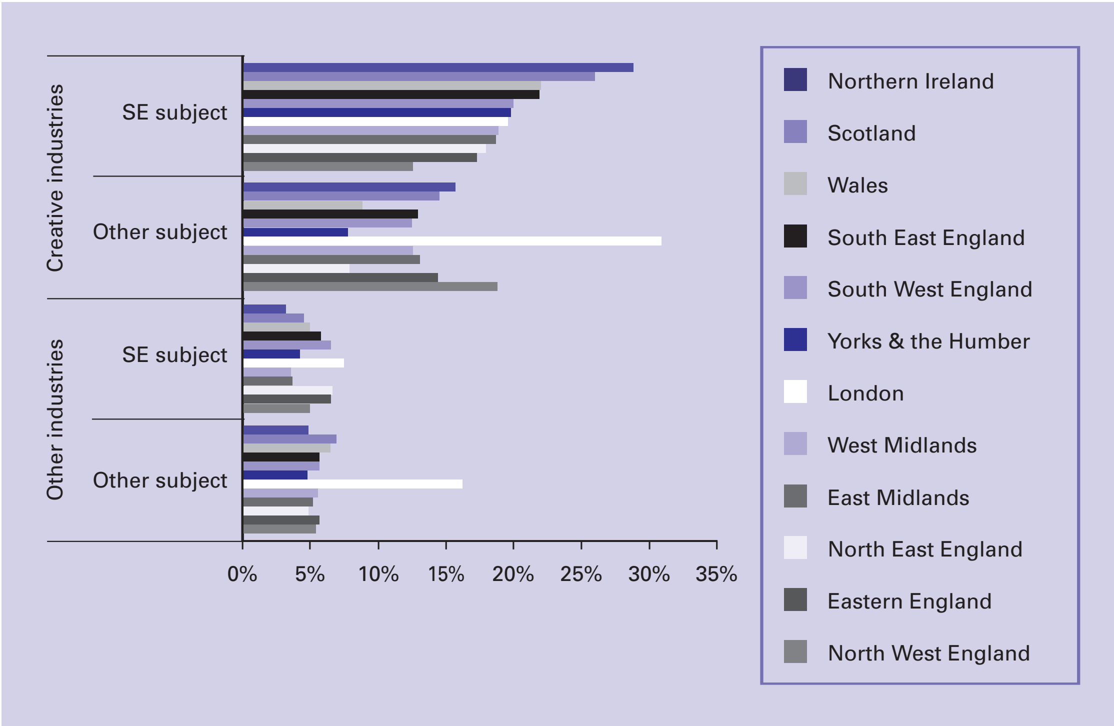
Figure 2.2.4: Innovation activity



Other interesting points:

- Creative Industries show significantly higher values of innovation indicators than other industries.
- There appears to be greater regional variation in the percentage of innovation active enterprises with over 75 per cent of creative firms in Yorkshire & Humberside, Northern Ireland and the South East having innovation activity.
- Over a fifth of Creative businesses have co-operation agreements, nearly twice as many as other industries.
- Within these businesses, the work force has a higher proportion of graduates (Figure 2.2.5 below) regardless of geographic location and, noticeably, on average a higher percentage of Science and Engineering graduates.

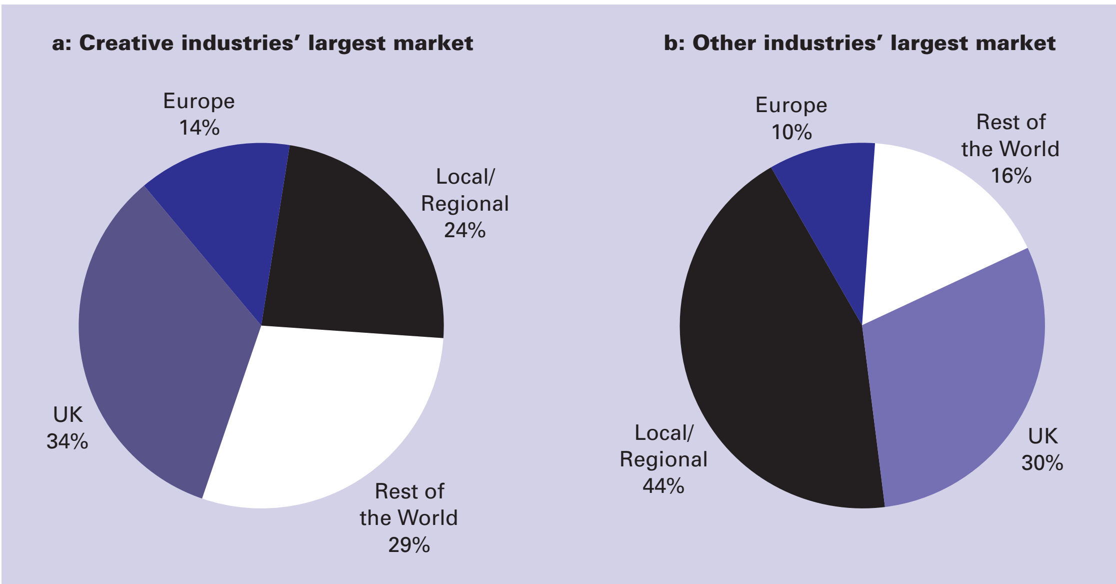
Figure 2.2.5: Average percentage of employees educated to degree level



Markets and Impacts

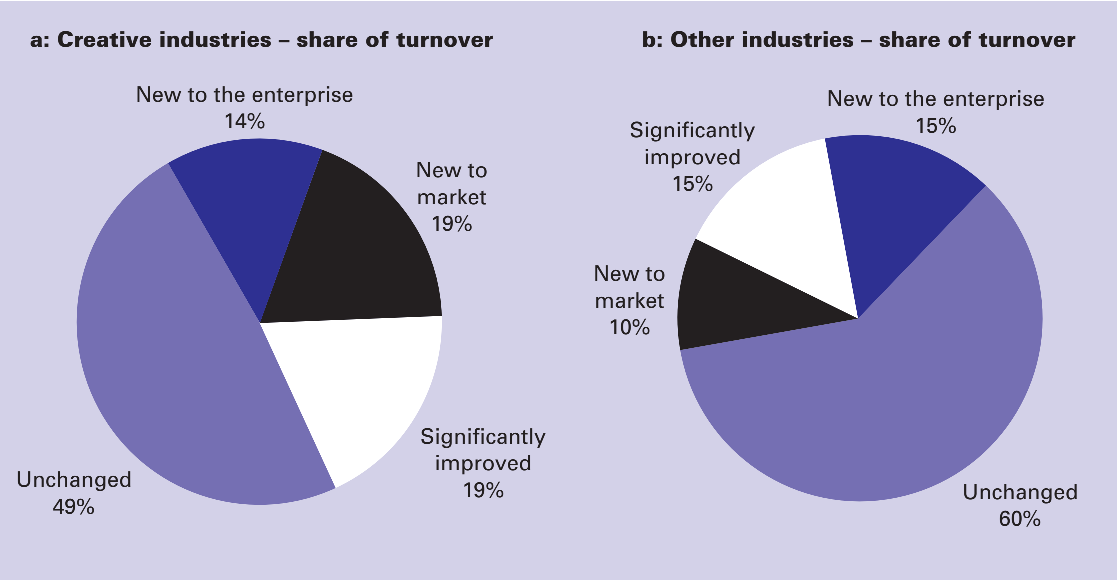
The creative industries tend to operate on a more national and international level with just under a quarter of its largest markets regionally/locally based. Creative industries also reported their product-orientated effects had higher impact, with improved quality of goods or services the most significant.

Figure 2.2.6



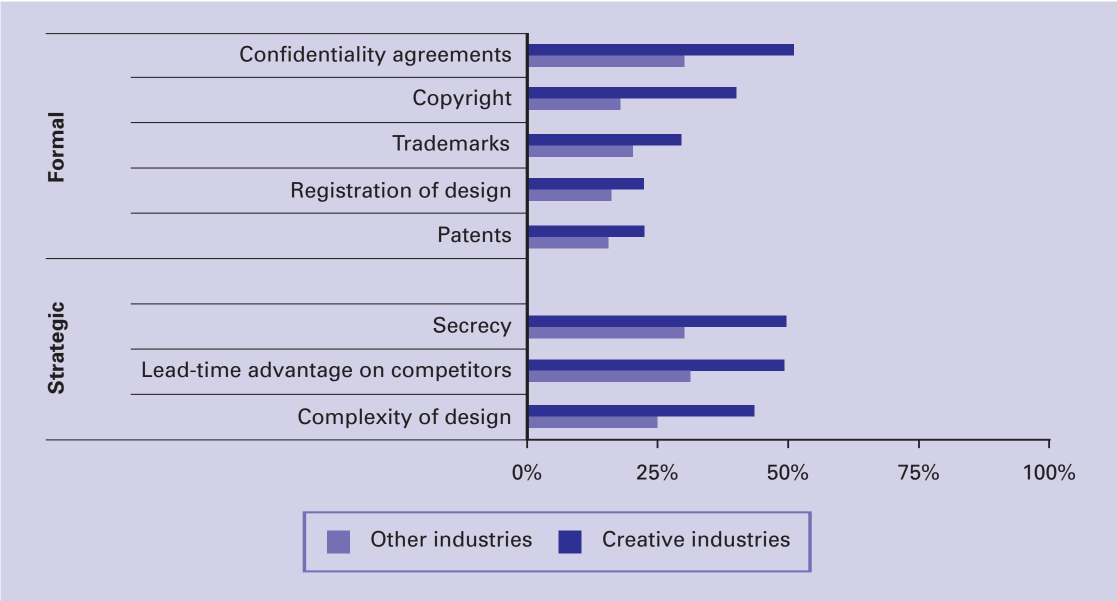
- These enterprises attribute over half of their turnover to their product innovations

Figure 2.2.7



Creative businesses are also more active at protecting their innovations due to in part, the greater levels of originality, as shown in Figure 2.2.8 below.

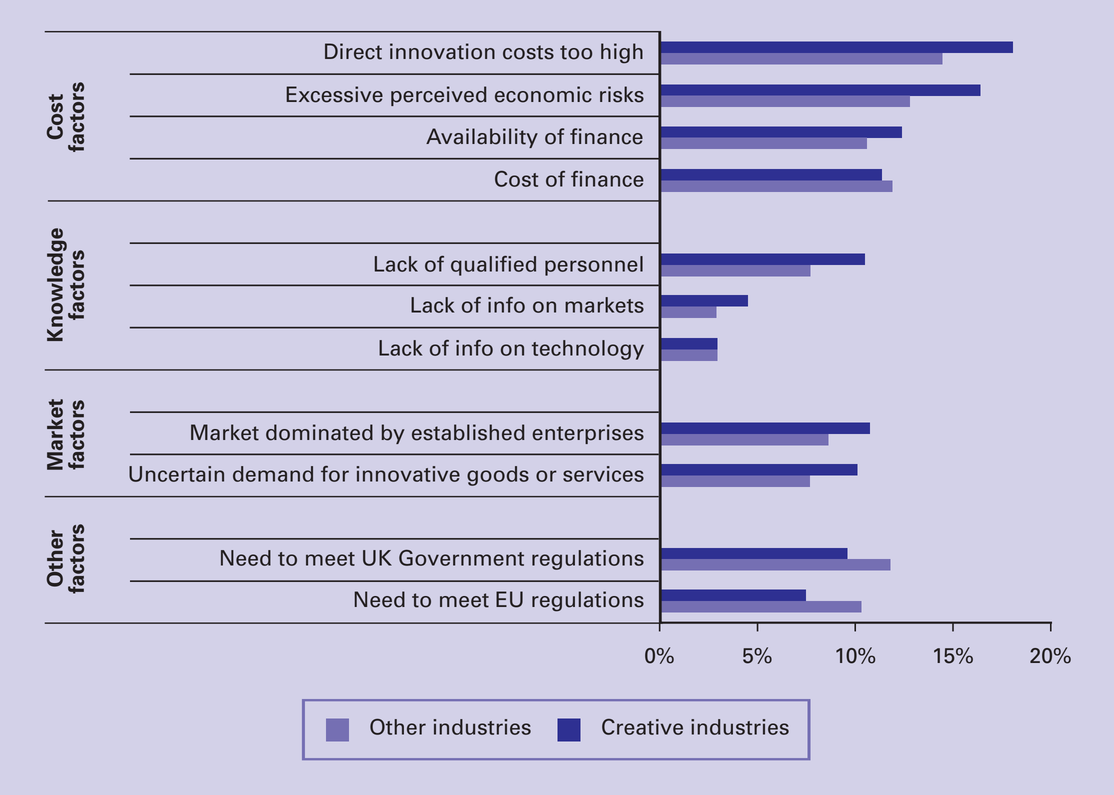
Figure 2.2.8: Protecting innovation



Constraints

As we will see in Chapter 4, the more innovative the organisation, the greater the perceived barriers to innovation. Therefore, it is of no surprise that creative enterprises rate most barriers higher than other industries. It's interesting that although on average a higher proportion of the work force within a creative enterprise possesses a degree, the industry ranks lack of qualified personnel higher than other industries.

Figure 2.2.9: Barriers to innovation, 'high' ratings only



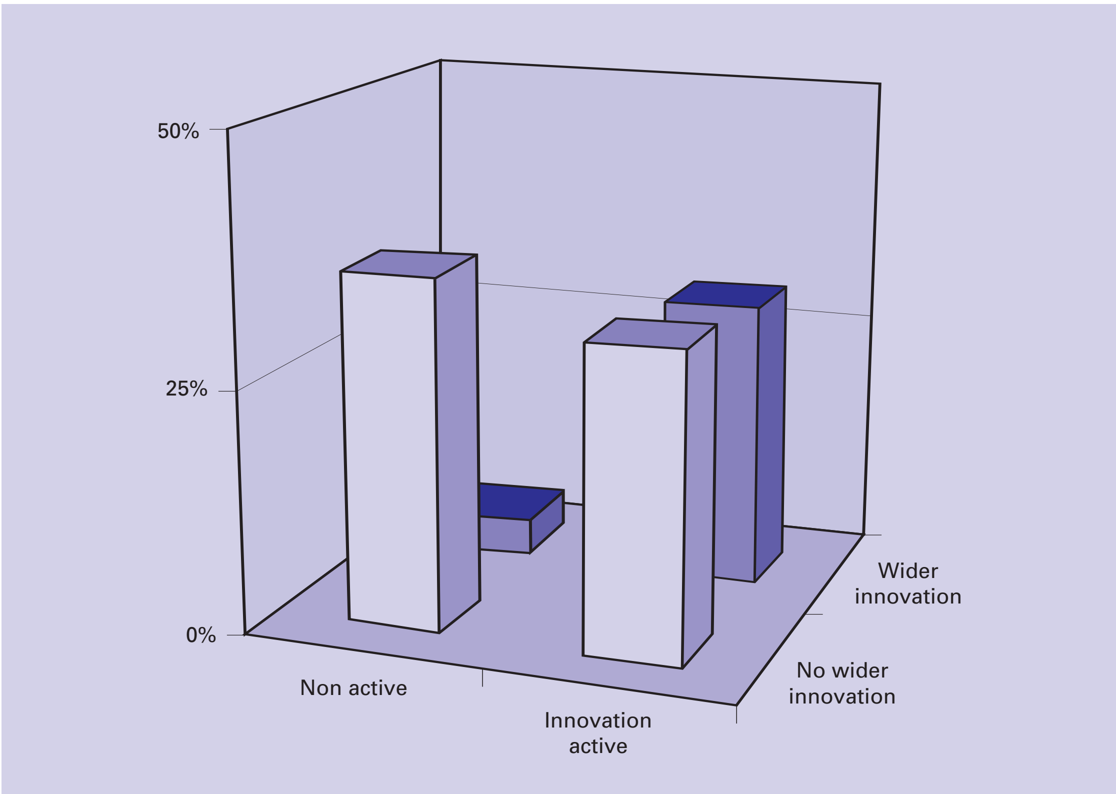
3 Management and the Demand Side

Introduction

This Chapter covers two of the main factors, internal and external to firms, that condition the amount and nature of investment in and implementation of innovation in goods, services and the processes for supplying them. These are firstly, significant changes in management strategies and business organisation, already partly covered in the Indicators section and secondly the nature of market demand and its impact on innovation activity.

The two broad categories of innovation considered in this report – implementing or investing in product and process change or implementing managerial change, can be introduced jointly or separately, that is, can be treated as complementary or substitute ways of changing the operations of the business or its product offerings to gain competitive advantage. Implementing solely the managerial types of innovation was very much a minority option over the survey period, as shown in Figure 2.3.1.

Figure 2.3.1: Innovation active and wider innovation, all enterprises



- While over 30 per cent of all businesses were innovation active without any of the managerial forms, only four per cent engaged in strategic managerial change without investing in or implementing product of process innovations.
- Nearly one third of businesses combined traditional innovation activities with one or more of the wider forms.

The managerial forms of innovation can also be combined with the product or process types. In the survey, around 50 per cent of business units with managerial changes also introduced new or improved products (goods or services) while just over one third brought in new or improved production or distribution processes.

Markets and customers

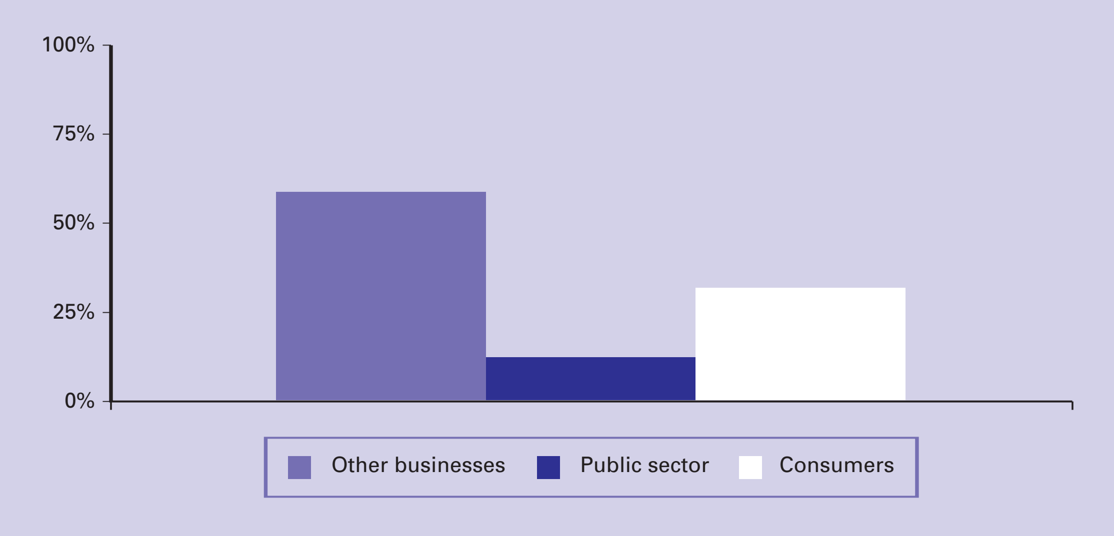
The study of innovation has focussed on the activity of suppliers of goods and services and the survey largely follows that approach. Other forms of conditioning or contextual factor for the business innovation decision include the market for the product and the characteristics of customers.

Most forms of innovation have the objectives of meeting the needs of customers and markets more effectively. This can be through the specifications of the goods and services offered or though efficiencies in the production, distribution and selling of them. The role of demand conditions in business innovation has been relatively less studied by analysts than supply side conditions, including the developments and application of technology. A major reason for this relative emphasis is the difficulty of establishing demand characteristics for innovation in goods and services. Most collection of data on innovation, including the present survey, is from businesses and tends to be oriented to their production and distribution activities. The Third revision of the Oslo manual points out the importance of demand in the innovation equation, that product revisions or replacements have to meet or change customer needs and preferences. The concept of marketing innovation introduced to the range of definitions in that revision of the manual is largely concerned with changes in approach to the market that shift customer preferences. It has been noted above that a substantial share of expenditures on implementing or developing innovations falls in the marketing and market preparation category. The manual though emphasises the difficulty of framing useful questions on the role of demand in surveys aimed at suppliers. The UK survey does cover some aspects of the demand side of markets and this section reports on the evidence from those lines of questioning.

Main Customers

A new question in the 2005 survey is the nature of the businesses most important customers – other businesses, public sector or consumers. This is intended to provide some indication, of the extent of stimulus to innovative behaviour, of the perceived needs of these broadly defined customer groups.

Figure 2.3.2: Main customer groups, all enterprises



- This pattern of demand shows some variation by business size, with a higher share of smaller businesses recording consumers as the main market.

Table 2.3.1: Main customers, percentage of all enterprises

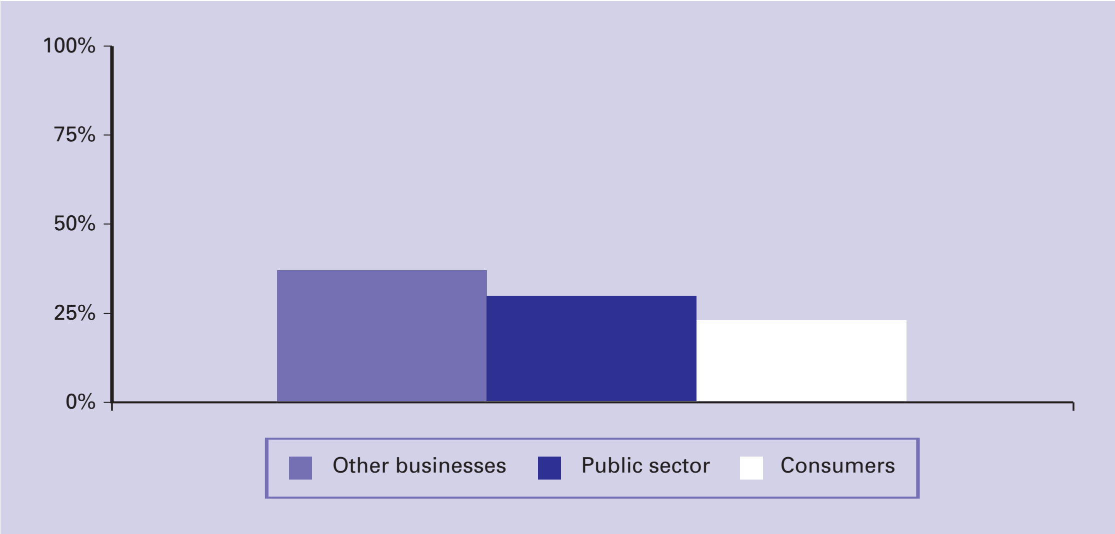
		Size of enterprises; employees		
Per cent	**All enterprises**	**10-49**	**50-249**	**250+**
Other Business	57	55	67	65
Public Sector	11	12	9	8
Consumers	31	33	24	27

- The nature of the customer base shows some systematic variation by business sector, with much higher shares of retail, distributive trades and hotels and catering seeing consumers as their main source of business, as would be expected.

Innovation and the customer

An immediate question is the extent of variation in innovation propensity according to the identity of the main customer. The product or process innovation propensity is highest where the main customers are other businesses and lowest where the firm is consumer facing. Suppliers to the public sector show an intermediate propensity to innovate.

Figure 2.3.3: Shares who are product or process innovators, by main customer



Main markets

The nature and geographical reach of a businesses market is also known to be important for the level and mode of innovation activity. Analysis using previous iterations of the survey, as well as much research literature, has found that exposure to wider markets – including overseas – has a positive effect on the rate of innovation. Results from the present survey confirm that expectation. Respondents indicate the geographical extent of their markets, whether they supply locally, nationally, within Europe or Worldwide. Table 2.3.2 summarises the results for the population of all businesses.

Table 2.3.2: Product innovators by size and geographical reach

		Size of enterprises; employees		
Per cent	**All enterprises**	**10-49**	**50-249**	**250+**
Local/Regional	23	26	12	10
UK	29	30	25	29
Europe	14	13	17	14
World	35	31	47	47

- The share of businesses with product innovations increases with the extent of the market. This pattern is similar across size groups. At this level of analysis, the differentiation of innovation propensity by market is not simply reflecting the behaviour or large against smaller enterprises.

Table 2.3.3: Share of product innovators by largest geographical market

Largest geographical market covered	Share of product innovators
Local/Regional	14
UK	25
Europe	35
World	52

Similar findings apply in the case of process and managerial innovations. Adam Smith's famous axiom that the division of labour is limited by the extent of the market can be taken across to some of the basic forms of innovation recorded here. Taking on wider market places – and therefore more opportunities but also more competition provides a stimulus to various forms of innovative behaviour.

4 Constraints on Innovation

A potentially important use of innovation survey data is to identify the reasons for absence of innovation activities and outcomes. These can provide insights into possible policy actions to alleviate the constraints and to create a more innovation friendly business environment. The survey looks at the issue of low or absent innovation levels through two aspects – reasons for lack of innovation activity and the specific constraints on the ability to innovate successfully.

Absence of activity

Enterprises who reported no innovation activity were asked to choose the reason for this from a menu of three options. The responses are set out in Table 2.4.1.

- Over half of non-innovators did not perceive a market need to change their products or processes, while around one third were inhibited by specific constraining factors.

Table 2.4.1: Reasons for no innovation, percentage of non-innovation active enterprises only

Respondents only		All 10+	10-49	50-249	250+
All sectors					
	No need due to prior innovations	34	34	32	30
	No need due to market conditions	52	52	52	50
	Factors constraining innovation	29	30	24	24

NB: This is a multiple response question and columns sum to more than 100%.

Specific Constraints

Respondents were offered a list of specific constraining factors. Table 2.4.2 shows the shares of all enterprises who reported these as having various degrees of importance.

Table 2.4.2: Constraints faced, percentage of all enterprises

		Not important	Low	Medium	High
All sectors					
Cost factors	Excessive perceived economic risks	50	17	20	13
	Direct innovation costs too high	51	15	20	15
	Cost of finance	49	20	19	12
	Avaibility of finance	52	22	15	11
Knowledge factors	Lack of qualified personnel	50	23	19	8
	Lack of info on technology	55	30	13	3
	Lack of info on markets	55	29	13	3
Market factors	Market dominated by established enterprises	52	21	18	9
	Uncertain demand for innovative goods or services	52	21	19	8
Other factors	Need to meet UK Government regulations	56	19	14	12
	Need to meet EU regulations	60	18	12	10

- Consistent with other surveys, cost factors, including direct resource costs, risks and finance were reported as of some importance with greater frequency than other forms of constraint.
- But around half of firms did not find any constraints of importance.

Enterprises without innovation activity, due to specific constraint factors attributed significantly lower levels of importance to the range of constraints, as summarised in Table 2.4.3.

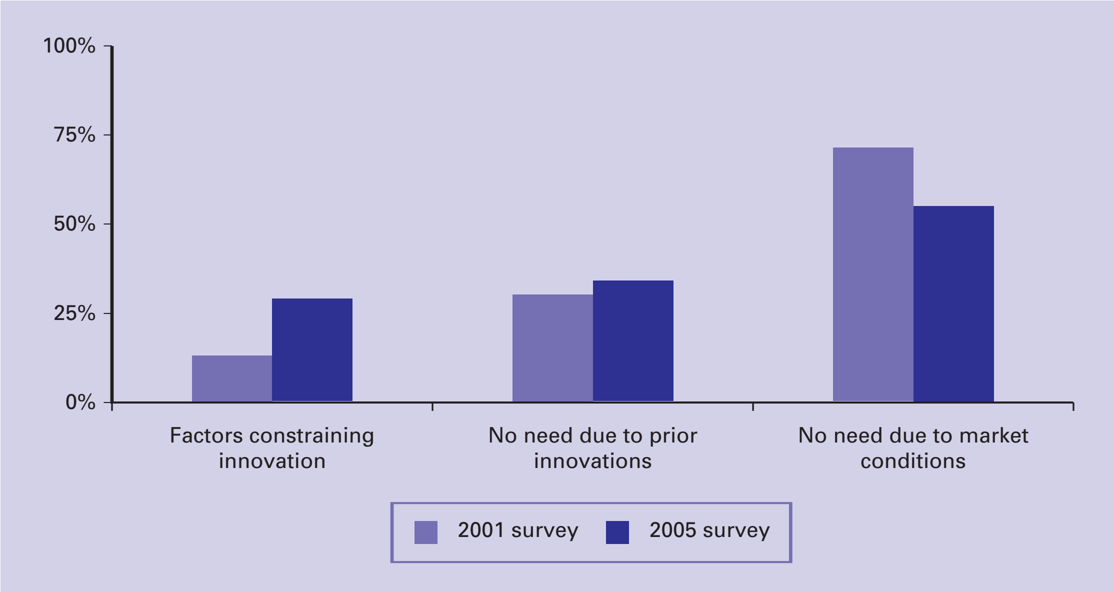
Table 2.4.3: Constraints faced, non-innovation active enterprises only

		Not important	Low	Medium	High
All sectors					
Cost factors	Excessive perceived economic risks	77	8	9	7
	Direct innovation costs too high	77	6	8	8
	Cost of finance	75	9	8	8
	Avaibility of finance	76	10	7	6
Knowledge factors	Lack of qualified personnel	75	11	9	5
	Lack of info on technology	78	14	6	2
	Lack of info on markets	79	14	6	2
Market factors	Market dominated by established enterprises	76	10	8	6
	Uncertain demand for innovative goods or services	77	10	8	5
Other factors	Need to meet UK Government regulations	77	9	7	7
	Need to meet EU regulations	79	9	6	6

- Innovation active enterprises, having experienced barriers while innovating are more much likely to report some importance to specific constraints.

Changes over time – 2001 and 2005 surveys

Figure 2.4.1: Reasons for no innovation activity, non innovation active enterprises only



- Differences in data collection make it difficult to compare like-for-like reasons given for not being innovation active. However, it seems clear that market conditions have limited the need for innovation activity proportionally less and that specific factors have seen an increase in importance since the late 1990s.

Annex A: Technical details of the UK Innovation Survey 2005

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 (DETINI).

The UK Innovation Survey is part of a wider Community Innovation Survey (CIS) covering European countries. The survey is based on a core questionnaire developed by the European Commission (Eurostat) and Member States. This is the fourth iteration of the survey (CIS 4) – CIS 3, covering the period 1998 to 2000, was carried out in 2001 and the results form part of various EU benchmarking exercises (see www.cordis.lu/innovation-smes/scoreboard/home.htm).

The UK Innovation Survey 2005 sampled over 28 thousand UK enterprises. The survey was voluntary and conducted by means of a postal questionnaire. A copy of the questionnaire used can be found on http://www.dti.gov.uk/innovation/innovation-statistics/cis/cis4-qst/page11578.html

Coverage and sampling

The survey covered enterprises with 10 or more employees in sections C-K of the Standard Industrial Classification (SIC) 2003. The 2005 survey included additional sectors Sale, maintenance and repair of motor vehicles (SIC 50), Retail Trade (SIC 52) and Hotels and restaurants (SIC 55) excluded from the 2001 survey. The sample was drawn from the ONS Inter-Departmental Business Register (IDBR) in December 2004. Details can be found at www.dti.gov.co.uk/innovation/innovation-statistics/cis/cis4-sample/page11777.html

Response and Weighting

The questionnaires from the initial survey were distributed on March 31 2005.

Valid responses were received from 16,446 enterprises to give a response rate of 58 per cent.

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 11 enterprises in the population.

Changes over time – 2001 and 2005 surveys

Comparisons can be made with the 2001 UK Innovation Survey, which measured innovation over the period 1998-2000. The sectoral coverage of the Innovation Survey in 2005 was widened considerably to include a larger portion of the service sector. The additional sector are: Sale, Maintenance and Repair of Motor Vehicles, Retail Trade, Hotels and Restaurants.

The 2005 definition of innovation active was applied to the 2001 survey.

Some 2001 data have been estimated to allow for changes in data collection.

Other differences between the surveys; such as in the sample design and weighting methodology, are not accounted for.

Definitions

Division

Enterprises are defined by the Standard Industrial Classification of Economic Activities – SIC(92).

SIC(92) is a hierarchical five digit system.

Each division is uniquely defined at the two digit level. Division are broken down into groups (3 digits).

Then into classes (4 digits) and, in several cases, into subclasses (5 digits).

Division No	SIC codes	Main activities
Division 1	10 to 14	Mining and Quarrying
Division 2	15 to 22	Mfr of food, clothing, wood, paper, publish & print
Division 3	23 to 29	Mfr of fuels, chemicals, plastic metals & minerals
Division 4	30 to 33	Mfr of electrical and optical equipments
Division 5	34 to 35	Mfr of transport equipments
Division 6	36 to 37	Mfr not elsewhere classfied
Division 7	40 o 41	Electricity, gas & water supply
Division 8	45	Construction
Division 9	50 to 51	Wholesale Trade (incl cars & bikes)
Division 10	52	Retail Trade (excl cars & bikes)
Division 11	55	Hotels & restaurants
Division 12	60 to 63	Transport
Division 13	64.1	Post and courier activities
Division 14	64.2	Telecommunications
Division 15	65 to 67	Financial intermediation
Division 16	70	Real estate activities
Division 17	71	Renting of machinery, equipment, personal, and household goods
Division 18	72	Computer and related activities
Division 19	73.1	Research and experimental development on natural sciences and engineering
Division 20	73.2	Research and experimental development on social sciences and humanities
Division 21	74.2	Architectural and engineering activities and related technical consultancy
Division 22	74.3	Technical testing and analysis
Division 23	Rest of 74	Other business activities

Sectors of industry

Enterprises were clustered into seven sectors of industry. Those sectors are defined as followed by their SIC(92) codes:

Sector	SIC codes
Primary sector	10 to14, 40 to 41
Engineering-based Manufacturing	28 to 35
Other Manufacturing	15 to 27, 36 to 37
Construction	45
Retail & distribution	50 to 52
Knowledge-intensive services	64.2, 65 to 67, 72 to 73, 74.1 to 74.4
Other services	55, 60 to 64.1, 70 to 71, 74.5 to 74.8

Creative industries

Data on Creative Industries drawn from the UK Innovation Survey 2005 are indicative only. Creative industries with a SIC(92) code beyond 74 were not covered by the survey. Other industries were included as a whole while only a proportion of those industry groups may be 'creative'. Were defined as belonging the creative industry those enterprises with the following SIC(92) codes:

SIC Main activities	SIC Main activities
74.4 Advertising	22.14 Music and the visual and performing arts
74.2 Architecture	22.31 Music and the visual and performing arts
52.48/9 Arts/antique trade	22.11 Publishing
52.5 Arts/antique trade	22.12 Publishing
	22.13 Publishing
74.87 Designer fashion	22.15 Publishing
22.32 Video, film, music & photography	22.33 Computer games, software, electronic publishing
74.81 Video, film, music & photography	72.21 Computer games, software electronic publishing
	72.22 Computer games, software, electronic publishing

Response rates

Overall	Sample	Achieved sample	Response rate
UK	28,530	16,445	58%

Regions	Sample	Achieved sample	Response rate
North East England	1,635	950	58%
North West England	2,590	1,500	58%
Yorks & the Humber	2,320	1,350	58%
East Midlands	2,235	1,330	59%
West Midlands	2,450	1,455	59%
Eastern England	2,410	1,420	59%
London	2,980	1,615	54%
South East England	2,930	1,740	59%
South West England	2,335	1,360	58%
Wales	1,860	1,100	59%
Scotland	2,215	1,270	57%
Northern Ireland	2,560	1,360	53%

Size	Sample	Achieved sample	Response rate
Small	15,660	9,100	58%
Medium	6,640	3,945	59%
Large	6,230	3,400	55%

Industries	Sample	Achieved sample	Response rate
Division 10-14	330	195	60%
Division 15-22	2,595	1,435	55%
Division 23-29	3,325	1,905	57%
Division 30-33	1,120	665	59%
Division 34-35	770	405	52%
Division 36-37	895	515	57%
Division 40-41	70	35	54%
Division 45	2,885	1,615	56%
Division 50-51	2,260	1,340	59%
Division 52	2,715	1,545	57%
Division 55	1,805	990	55%
Division 60-63	1,850	1,060	57%
Division 64.1	285	155	54%
Division 64.2	290	180	61%
Division 65-67	1,185	675	57%
Division 70	725	415	57%
Division 71	475	285	60%
Division 72	765	440	58%
Division 73.1	320	205	65%
Division 73.2	50	30	59%
Division 74.2	715	480	67%
Division 74.3	240	155	64%
Rest of Division 74	2,865	1,725	60%

Data rounded to the nearest 5. ‘C’ indicates disclosure data.

Unweighted population

	Sizeband			
Industry	**10-49**	**50-249**	**250+**	**All 10+**
Division 10-14	125	60	15	**195**
Division 15-22	730	345	360	**1,435**
Division 23-29	1,045	505	355	**1,905**
Division 30-33	365	155	145	**665**
Division 34-35	185	105	115	**405**
Division 36-37	320	135	60	**515**
Division 40-41	20	10	5	**35**
Division 45	1,140	285	190	**1,615**
Division 50-51	595	415	335	**1,340**
Division 52	1,005	255	285	**1,545**
Division 55	520	265	210	**990**
Division 60-63	685	185	185	**1,060**
Division 64.1	110	35	5	**155**
Division 64.2	105	55	20	**180**
Division 65-67	380	140	150	**675**
Division 70	235	115	70	**415**
Division 71	155	95	35	**285**
Division 72	255	110	70	**440**
Division 73.1	120	65	25	**205**
Division 73.2	30	c	c	**30**
Division 74.2	265	110	60	**435**
Division 74.3	115	35	5	**155**
Rest of Division 74	590	470	705	**1,765**
All divisions	**9,100**	**3,945**	**3,400**	**16,445**

	Sizeband			
Region	**10-49**	**50-249**	**250+**	**All 10+**
North East England	640	215	100	**950**
North West England	800	330	370	**1,500**
Yorks & the Humber	750	305	295	**1,350**
East Midlands	805	300	225	**1,330**
West Midlands	810	340	305	**1,455**
Eastern England	810	330	275	**1,420**
London	690	320	610	**1,615**
South East England	880	335	525	**1,740**
South West England	840	285	235	**1,360**
Wales	620	355	125	**1,100**
Scotland	660	355	255	**1,270**
Northern Ireland	805	475	80	**1,360**
All regions	**9,100**	**3,945**	**3,400**	**16,445**

Data rounded to the nearest 5. ‘C’ indicates disclosure data.

Weighted population

Industry	10-49	Sizeband 50-249	250+	All 10+
Division 10-14	245	95	30	**365**
Division 15-22	9,030	2,525	710	**12,270**
Division 23-29	13,000	3,620	785	**17,400**
Division 30-33	2,830	995	275	**4,100**
Division 34-35	960	470	240	**1,665**
Division 36-37	2,460	505	95	**3,060**
Division 40-41	35	25	5	**65**
Division 45	14,960	1,865	345	**17,170**
Division 50-51	21,520	3,460	595	**25,575**
Division 52	13,725	1,260	530	**15,515**
Division 55	19,085	2,055	350	**21,485**
Division 60-63	6,040	955	400	**7,395**
Division 64.1	1,005	205	15	**1,230**
Division 64.2	990	330	40	**1,355**
Division 65-67	3,000	725	345	**4,075**
Division 70	4,880	775	115	**5,775**
Division 71	2,830	715	55	**3,600**
Division 72	5,495	795	125	**6,410**
Division 73.1	2,485	510	40	**3,035**
Division 73.2	720	c	c	**720**
Division 74.2	4,935	730	105	**5,770**
Division 74.3	2,310	245	10	**2,565**
Rest of Division 74	12,925	3,210	1,255	**17,385**
All divisions	**145,470**	**26,060**	**6,450**	**177,985**

Data rounded to the nearest 5. 'C' indicates disclosure data.

Region	10-49	Sizeband 50-249	250+	All 10+
North East England	4,780	880	220	**5,880**
North West England	15,870	2,900	705	**19,475**
Yorks & the Humber	12,060	2,230	520	**14,810**
East Midlands	10,685	1,950	440	**13,070**
West Midlands	13,095	2,370	575	**16,040**
Eastern England	13,625	2,305	515	**16,445**
London	20,480	3,930	1,190	**25,600**
South East England	20,550	3,540	975	**25,065**
South West England	12,635	2,020	430	**15,080**
Wales	5,205	1,025	235	**6,465**
Scotland	10,720	1,960	485	**13,165**
Northern Ireland	5,765	955	165	**6,880**
All regions	**145,470**	**26,060**	**6,450**	**177,985**

Annex B: Data supporting Figures

This annex provides the data for all the Figures in this report. All data, apart in Figure 2.1.2, are in percentages.

Data for Figure 1.1

	250+	50-249	10-49
2001 survey	64	53	43
2005 survey	75	70	60

Data for Figure 1.2

	2001 survey	2005 survey
Construction	32	44
Other services	36	53
Primary sector	35	54
Retail and distribution	39	61
Knowledge Intensive services	51	69
Other manufacturing	52	70
Engineering manufacturing	54	73
All firms	45	62

Data for Figure 1.3

	Innovation expenditure - % of total
Acq of external knowledge	4
All forms of design	5
Training	6
Extramural R&D	7
Marketing expenditure	16
Intramural R&D	26
Acq of machinery, equipment & software	37

Data for Figure 1.4

	Primary sector	Engineering-based manufacturing	Other manufacturing	Construction	Retail and distribution	Knowledge-intensive services	Other service
Acq of machinery, equipment & software	57	27	53	43	40	27	51
Intramural R&D	31	39	21	12	7	36	11
Training	6	4	4	25	6	4	11
All forms of design	2	8	4	3	4	4	2
Marketing expenditure	2	8	12	13	38	13	20
Extramural R&D	1	8	5	2	2	12	2
Acq of external knowledge	1	5	2	2	3	4	3

Data for Figure 1.5

	R&D	Acq of machinery	Acq of external knowledge	Training	All forms of design	Marketing expenditure
North East England	14	63	3	5	4	10
North West England	41	39	3	5	3	9
Yorks & the Humber	22	54	4	5	3	12
East Midlands	33	40	4	7	4	12
West Midlands	27	46	2	6	9	10
Eastern England	36	34	4	5	4	17
London	34	22	4	7	2	31
South East England	32	39	2	3	7	17
South West England	35	29	4	4	7	21
Wales	27	38	10	11	2	12
Scotland	31	40	4	7	7	11
Northern Ireland	26	57	1	9	2	6

Data for Figure 1.6

	Other services	Construction	Other manufacturing	Engineering-based manufacturing	Primary sector	Knowledge-intensive services	Retail and distribution
New to industry	28	15	30	29	13	35	25
New to market	48	48	58	61	63	64	66

Data for Figure 1.7

	New to industry	New to market
North West England	26	51
Yorks & the Humber	35	54
West Midlands	29	56
Wales	28	56
Northern Ireland	32	57
North East England	38	57
East Midlands	24	57
South East England	30	62
South West England	33	63
London	35	63
Eastern England	22	65
Scotland	30	65

Data for Figure 1.8

	2001 survey	2005 survey
Novel process innovators	31	31
Novel product innovators	43	60

Data for Figure 1.9

	Primary sector	Engineering-based manufacturing	Other manufacturing	Construction	Retail and distribution	Knowledge-intensive services	Other services
New to market	11	9	8	8	12	17	8
New to the firm	10	13	13	17	15	13	18
Improved product	13	15	13	19	11	18	18

Data for Figure 1.10

	New to market	New to the enterprise	Significantly improved
West Midlands	9	14	13
East Midlands	10	14	14
North West England	9	15	14
South West England	12	14	14
Eastern England	11	14	14
Northern Ireland	11	12	16
Yorks & the Humber	10	13	16
Scotland	14	15	13
Wales	9	17	16
North East England	9	17	17
South East England	12	14	18
London	15	17	17

Data for Figure 1.11

	Primary sector	Engineering-based manufacturing	Other manufacturing	Construction	Retail and distribution	Knowledge-intensive services	Other service
2001 survey	8	6	3	3	5	16	3
2005 survey	10	7	3	4	3	20	3

Data for Figure 1.12

		Not relevant	Low	Medium	High
Other effects	Reduced environmental impacts or improved health & safety	36	22	26	16
	Met regulatory requirements	32	16	25	27
	Increased value added	21	14	37	28
Process orientated effects	Improved flexibility of production or service provision	27	18	37	18
	Increased capacity for production or service provision	30	19	32	18
	Reduced costs per unit produced or provided	32	19	27	22
Product orientated effects	Increased range of goods or services	25	16	34	25
	Entered new markets or increased market share	25	17	32	26
	Improved quality of goods or services	17	10	39	34

Data for Figure 1.13

	2001 survey	2005 survey
Reduced environmental impacts	46	64
Met regulatory requirements	51	69
Reduced costs	52	70
Increased capacity	58	73
Improved flexibility	54	75
Increased range	67	75
Entered new markets	65	77
Improved quality	73	84

Data for Figure 1.14

	10-49	50-249	250+
Wider Innovator	30	45	58
Non Wider Innovator	70	55	42

Data for Figure 1.15

	Wider innovation intensity
One change	41
Two changes	27
Three changes	19
Four changes	13

Data for Figure 1.16

	Corporate strategy	Management techniques	Organisational change	Marketing strategy
Corporate strategy		44	63	60
Management techniques	53		55	57
Organisational change	61	43		59
Marketing strategy	50	39	52	

Data for Figure 1.17

	2001 survey	2005 survey
Universities or other HEIs	16	24
Government or public research institutes	21	25
Consultants, commercial labs, private R&D institutes	36	39
Conferences, trade fairs, exhibitions	49	50
Scientific journals	43	51
Technical, industry or service standards	48	52
Professional and industry associations	40	54
Competitors	42	61
within your enterprise or enterprise group	53	64
Suppliers	55	68
Clients or customers	52	69

Data for Figure 1.18

	Cooperative firms partners
Suppliers	76
Clients or customers	74
within your enterprise or enterprise group	50
Competitors	44
Consultants, commercial labs, private R&D institutes	42
Universities or other HEIs	33
Government or public research institutes	31

Data for Figure 1.19

	Geographical distribution of enterprises' partners
UK	69
Local/Regional	65
Europe	32
Other	25

Data for Figure 2.1.1

	No collaboration with universities	Some collaboration with universities
Range		
None	44	15
Low	14	14
Medium	25	37
High	16	34
Market Share		
None	45	17
Low	14	16
Medium	23	35
High	18	32
Quality		
None	36	10
Low	9	12
Medium	30	38
High	24	40
Value Added		
None	42	13
Low	12	13
Medium	28	39
High	18	36

Data for Figure 2.1.2

	Local/ regional	UK	Europe	Other
Range	1.8	2.2	2.8	2.6
Market Share	1.7	2.1	2.7	2.5
Quality	1.4	1.9	2.1	1.4
Value Added	1.8	2.0	2.0	2.1
Capacity	1.5	2.0	1.7	1.9
Flexibility	1.7	1.9	1.9	1.6
Costs	1.2	1.9	1.6	1.5
Environment	1.4	1.8	1.2	1.5
Regulatory	1.4	1.4	1.0	1.4

Data for Figure 2.1.3

	Importance of University as Info Source			
	High	Medium	Low	Not used
None	1	4	12	82
Local/Regional	15	29	29	27
UK	18	37	33	12
Europe	24	37	24	15
World	30	38	27	4

Data for Figure 2.2.1

	Neither of those	Design based	Technology based	Design inclusive
Innovation active	36	11	14	39
Goods innovators	15	8	9	67
Process only innovators	39	11	14	35
Service innovators	23	10	15	52

Data for Figure 2.2.2

	Design based	Technology based	Design inclusive
Product innovator	60	38	32
Process innovator	37	24	22

Data for Figure 2.2.3

	Geographical distribution of Creative Industries
Wales	3
Northern Ireland	3
North East England	3
East Midlands	5
Scotland	6
Yorks & the Humber	7
West Midlands	7
North West England	8
South West England	9
Eastern England	9
South East England	17
London	22

Data for Figure 2.2.4

	Mean	Std. Err.	1/2 interval	[95% Conf. Interval]
Other industries	56	0	1	55-57
Creative industries	69	1	3	67-72

Data for Figure 2.2.5

	Other industries		Creative industries	
	Other subject	SE subject	Other subject	SE subject
North West England	5	5	19	13
Eastern England	6	7	14	17
North East England	5	7	8	18
East Midlands	5	4	13	19
West Midlands	6	4	13	19
London	16	8	31	20
Yorks & the Humber	5	4	8	20
South West England	6	7	13	20
South East England	6	6	13	22
Wales	6	5	9	22
Scotland	7	5	14	26
Northern Ireland	5	3	16	29

Data for Figure 2.2.6a

	Creative industries' largest market
Europe	14
Local/Regional	24
Rest of the World	29
UK	34

Data for Figure 2.2.6b

	Other industries' largest market
Europe	10
Rest of the World	16
UK	30
Local/Regional	44

Data for Figure 2.2.7a

	Creative industries' – share of turnover
New to the enterprise	14
New to market	19
Significantly improved	19
Unchanged	49

Data for Figure 2.2.7b

	Other industries' – share of turnover
New to market	10
Significantly improved	15
New to the enterprise	15
Unchanged	60

Data for Figure 2.2.8

		Other industries	Creative industries
Strategic	Complexity of design	25	43
	Lead-time advantage on competitors	31	49
	Secrecy	30	49
Knowledge factors	Patents	15	22
	Registration of design	16	22
	Trademarks	20	29
	Copyright	18	40
	Confidentiality agreements	30	51

Data for Figure 2.2.9

		Other industries	Creative industries
Other factors	Need to meet EU regulations	10	7
	Need to meet UK Government regulations	12	9
Market factors	Uncertain demand for innovative goods or services	8	10
	Market dominated by established enterprises	9	11
Knowledge factors	Lack of info on technology	3	3
	Lack of info on markets	3	4
	Lack of qualified personnel	8	10
Cost factors	Cost of finance	12	11
	Availability of finance	10	12
	Excessive perceived economic risks	13	16
	Direct innovation costs too high	14	18

Data for Figure 2.3.1

	Non active	Innovation active
No wider innovation	36	31
Wider innovation	4	29

Data for Figure 2.3.2

	Main customer Groups
Other businesses	57
Public sector	11
Consumers	31

Data for Figure 2.3.3

	Product or process innovator
Other businesses	37
Public sector	30
Consumers	23

Data for Figure 2.4.1

	2001 survey	2005 survey
Factors constraining innovation	13	28
No need due to prior innovations	30	33
No need due to market conditions	72	55

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First published July 2006. Department of Trade and Industry. www.dti.gov.uk