

1 Introduction

1.1 Purpose and design of the survey

This report provides the analysis of a survey commissioned by the Higher Education Funding Council for England, on behalf of the four funding bodies for UK higher education¹ and the Office of Science and Technology.

The survey had four main objectives:

- To update previous surveys of interactions between higher education (HE) and business, covering the whole of the UK; and to capture the key outputs of such interactions, taking into account differing institutional missions, strategies, capacities and expertise.
- To quantify a UK baseline for the significant level of activity which has developed in higher education institutions (HEIs), and from which improvements in later years could be measured.
- To establish and test the robustness of selected indicators which might later inform decisions on further targeted funding for knowledge transfer activities.
- To assess the opportunity costs of an annual survey against the value and utility of the data collected.

Previous surveys were carried out in the mid to late 1990s by Tartan Technology and by Policy Research on Engineering, Science and Technology (PREST) at the University of Manchester (Howells et al, 1998). These provided data on patterns of business interaction, on the motivation for such interaction, and on the overall scale of activity within the HE sector. The last of these surveys related to the academic year 1996/97; the current survey updates this to 1999/2000.

Since the last survey, significant additional government support has been provided across the UK for HE-business interaction, as a third stream of public funding alongside those for teaching and research in higher education. During 1999/2000 the Higher Education Reach Out to Business and the Community (HEROBC) scheme was launched in England and Northern Ireland, building upon UK-wide initiatives such as University Challenge and Science Enterprise Challenge (SEC). This stream of work is to be taken forward in the Higher Education Innovation Fund from 2001. In parallel, in Scotland a new Knowledge Transfer Grant has been introduced by the Scottish Higher Education Funding Council, building upon an earlier Scottish Technology Ventures Initiative as well as SEC and other UK-wide programmes. Education and Learning Wales also has its own programmes, such as the Higher Education Economic Development Fund, whilst in Northern Ireland there is a series of specific projects developed between the two universities and government bodies.

It is anticipated that such schemes will lead to increases in interaction over subsequent years, with 1999/2000 being the baseline year before the impact of the new

¹ The Higher Education Funding Council for England (HEFCE), the Scottish Higher Education Funding Council (SHEFC), the Higher Education Funding Council for Wales (HEFCW), and the Department of Employment and Learning (DEL) in Northern Ireland.

programme begins to be realised. The future development of this third strand of funding will require ongoing monitoring of outcomes, but also decisions about new indicators and the suitability of existing indicators for assessing desired outcomes. This issue about the robustness of indicators has two dimensions: first there is the question of the accuracy of the data supplied for the indicators and hence their practicality in terms of repeatability; second is the question of whether the indicators are a reliable proxy for the phenomenon we wish to understand. This study examined these issues through the application of the questionnaire and associated discussions with HEI representatives.

Finally, as part of the project, the burden placed on the HE sector in responding to the questionnaire has been examined in order to assess the future costs of annual surveys and the relative benefits to the sector of providing such data.

1.2 Methodology and response rate

The survey sought to build on previous surveys, and notably that undertaken by PREST in 1998. Thus the sponsors required a comprehensive survey of all HEIs (universities and HE colleges) within the UK using a self-completion form covering both quantitative and qualitative indicators.

The total population to be surveyed consisted of 168 institutions primarily funded by the UK HE funding bodies. This number – slightly less than in the previous survey – is not fixed or unambiguous, as there are a number of factors affecting the total:

- At any one time a number of institutions are in merger negotiations. Several HE colleges have recently merged with nearby universities, often to provide specialist units such as schools of art. In addition, within London there is an ongoing process of rationalisation, with independent colleges within the University of London merging to form what are effectively large multi-purpose universities.
- One institution was in the process of transferring from being funded by a government department to being supported by a funding body.
- Within London some of the smaller units are managed by the university centrally, although the extent to which they should be included is not a clear division.

Overall we can expect a long-term reduction in the number of institutions. From a volume perspective many of the smaller colleges make a very small contribution to the aggregate picture, although they may be effective in their own right.

A complete listing of funded institutions was obtained from the funding bodies; and the address and name of the vice-chancellor or principal was obtained from Universities UK, the Standing Conference of Principals (SCOP) and direct examination of institutional websites.

A single questionnaire was drawn up to be sent to the institutional head, with a parallel circular from the funding bodies advising HEIs of the survey and requesting co-operation. The decision to use a single questionnaire rather than the two used in the previous survey was to simplify and unify the requirements. The previous survey had a slightly different response for the two questionnaires. However it was recognised that the various information requests would need inputs from different departments or units, so it was designed as a set of modules that could be handed out to different people and then re-assembled.

The questionnaire was designed to permit some continuity with both the PREST survey and the previous surveys by CURDS for the then Committee of Vice-Chancellors and Principals (CVCP) and the Department for Education and Employment (DfEE). In addition, the questionnaire was harmonised with the US Association of University Technology Managers (AUTM) survey on intellectual property to enable some international benchmarking. Finally, arising from a parallel study by CURDS for the HEFCE on the regional contribution of HE (Charles and Benneworth, 2001a), some questions from a benchmarking tool on HE regional engagement were included (Charles and Benneworth 2001b). The whole draft questionnaire was sent out to a sample of HEI industrial liaison managers for comment, including representatives of the University Companies Association (UNICO). Comments were also obtained from a steering group representing the funding units, key government departments, HE and the devolved administrations.

The questionnaire was sent out to the HEIs via the vice-chancellor or principal in February 2001, with an initial target submission date of 31 March. A number were returned within the allocated time; a reminder letter was sent out in April to encourage a further response, followed up by telephone reminders. A small number of HEIs were still completing their questionnaires in June and July. We particularly focused on the universities in the final stages, and on those institutions whose volume of activity was likely to have an influence on the sector totals, so the response rate for the university sector is higher than for colleges. In parallel, a sample of 25 HEIs were approached for telephone interviews about the burden of completion, which also stimulated responses.

By mid-July we had received 141 completed questionnaires and a further 7 responses where, for a variety of reasons, institutions felt that the survey was inappropriate for them to complete. Another response came in later and was used in some questions only, as it was too late to recalculate all tables. Overall, this gave us a total response rate of 89%.

Table 1.1 Response characteristics

Location	University			HE college			Total response rate
	Actual	Response	Response rate	Actual	Response	Response rate	
England	84	79	94%	48	38	79%	89%
Scotland	13	12	92%	8	6	75%	86%
Wales	8	7	88%	5	5	100%	92%
N.Ireland	2	2	100%	0	0		100%
Total	107	100	93%	61	49	80%	89%

Questionnaires were initially sent out in printed format, but a downloadable version was also made available on a CURDS website concerned with issues of HE-regional engagement. Respondents were asked to return questionnaires either by post or as email attachments. A relatively high proportion took up the opportunity to reply electronically, and often those that made a postal return had entered their data into an electronic version of the form. To facilitate this process the questionnaire was issued in a relatively simple form, as a Microsoft Word document with tick boxes and tables for data entry.

Another formatting issue was the treatment of the devolved territories. An additional aspect of the questionnaire was the regional perspective: the regional scale was taken to be that of the devolved territories of Scotland, Wales and Northern Ireland plus the nine English Regional Development Agency (RDA) regions. These are roughly comparable, with Scotland and Wales being directly comparable in size to English regions whilst Northern Ireland is two-thirds the size of the smallest English region. In order to avoid ambiguity over the terms national and regional, separate questionnaires were provided (and hosted separately on the website) for England, Scotland, Wales, and Northern Ireland, with slight variations in wording to ensure comparable responses.

In considering the results of the survey it is important to recognise the diversity of institutions, contexts and approaches used. HEIs have evolved from a variety of different backgrounds. Levels of specialisation vary, as does the emphasis on research and historic endowment. These variables will affect their capacity to engage in particular forms of strategy. HEIs in different regional locations will also face different levels of opportunity for business interaction according to the vibrancy of the local economy and the degree of fit between the strengths of the HEI and the composition of the local economy. HEIs may also adopt differentiated strategies.

Accordingly, rather than simply analysing the response as a single group, the sample can be split up in different ways to examine the nature of this diversity.

In terms of the type of institution, there is a clear distinction between a large research-based university with a medical school, and a small HE college specialised around arts disciplines. What is problematic, however, is the dividing lines and choice of parameters. One categorisation can be made based on research intensity. This has a strong overlap with a categorisation based on institutional history: pre-1992

universities, post-1992 universities, and HE colleges. In the analysis we have used this institutional categorisation because of its ease of implementation, and familiarity to most readers, although there are some concerns about whether this might be seen as reinforcing traditional stereotypes dating back now 10 years.

It is important to stress two points in arguing for the value of this institutional split. First, although the university sector has been unified for nearly 10 years, there remain significant quantitative and qualitative differences in aggregate between the pre- and post-1992 institutions. Chief among these is research income as a share of total income. Leaving aside small specialist colleges within the University of London, there are very few pre-1992 universities with a lower level of research intensity than the most research-intensive of the post-1992 universities. Greenwich, as the most research-intensive of the post-1992 group, has a higher percentage of income from research than universities such as Bradford, Hull and Brunel. Also universities such as Abertay, Plymouth and De Montfort have a greater proportion of research income than City, Salford and the Open University. There is thus some convergence in performance between the more research-active post-1992 universities and some of the older institutions. However, the differences are more striking in the big cities, where the old civic universities typically earn well over 10 times the research income of the neighbouring new universities, despite similar or even lower student numbers. Furthermore there is a break-point between the two groups of institutions in terms of aggregate Research Assessment Exercise score using the 1996 results.

Second, the process of incorporation for the post-1992 universities led to a number of differences in governance and management structures between them and existing universities. Some of these differences are brought out in the response to questions later in the report. Consequently post- and pre-1992 universities tend to respond differently when asked about the role of the region in their mission. Post-1992 universities identify themselves as primarily serving their region whilst also seeking to develop an international research mission. Pre-1992 universities see themselves as international research universities that seek to serve their region where it does not conflict with this international mission (CURDS survey, 1997).

The implementation of this categorisation is relatively straightforward for most institutions. However, we did decide to allocate a couple of London University colleges to the HE college sector due to their specialist focus, and low research income. The majority of London University institutions were included in the pre-1992 sector.

Another way of looking at institutions is by region. There are 12 regions in the UK, with varying size and number of institutions. These regions can be collapsed into four categories representing degrees of regional autonomy and core-periphery character. A first grouping is to combine the three devolved territories, where there are separate funding arrangements, long-established Regional Development Agencies, a strong sense of identity, 'peripherality' and long-standing regional funding. Applying these same criteria to the English regions, the three northernmost regions also share many of the economic problems of peripherality and industrial decline, have a strong sense of regional identity, and have a longer history of HEI collaboration through regional consortia. At the opposite extreme, London, the South-East and East essentially form one regional system, with a concentration of research activity in the public and private sector, a highly dynamic economy, a low regional identity and relatively weak regional collaboration due to the absence of regional funding and the sheer numbers

of HEIs involved. Finally the two Midlands regions and the South-West are hybrid regions, with a combination of dynamic and lagging local economies, an emerging sense of regional identity and need for regional collaboration among HEIs, but with strong internal divisions.

These kinds of divisions between regions in the UK are quite conventional among regional development researchers, and the rationale appears to be justified by the results for some of the questions, where despite considerable variations between regions there is much less variation within the groupings proposed. This suggests that these groupings are relatively robust for the current purpose.

There are other ways of segmenting the population of HEIs. The pre-1992 universities can be divided up in various ways, the most common of which is to separate out the Russell Group of large research-based universities with medical schools, comprising Oxford and Cambridge, the big London University colleges, and the civic or redbrick universities. This group does account for the largest share of research income, but excludes some 1960s universities with high levels of research activity and active business engagement. It was decided not to add this division to the existing three-way split of institutions.

We also considered using some of the indicators from the survey as a means of classifying HEIs. So for example the benchmarking questions used in the survey, where institutions were asked to grade their practices, could be used to give a classification of proactivity towards business interaction. A ranking was produced to assess the viability of this approach. However, there appeared to be some variation in the level of self-criticism applied, and we felt concerned that some institutions might be placed in a higher or lower category depending on how seriously they considered a question and whether they had given an over-optimistic or self-critical response. We therefore decided not to use this categorisation in the analysis.

2 Forms of HE-business interaction

2.1 Rationale for HE-business interaction

Measures to encourage interaction between higher education and business have a long history in the UK, some with a distinct regional or local dimension. Currently there is a rather complex mixture of national and local measures: some originating from previous programmes and initiatives, some having continued over many years, and some newly established. Indeed the history of policy to encourage university-industry engagement is one of constant change and a rapid stream of new initiatives, especially since the early 1980s.

In recent years there has been a steady increase in the focus given to industrial collaboration within public funding for research. Prior to the 1980s there was modest involvement of industry in programmes funded by the research councils, but the early 1980s saw the formation of the Alvey Programme as a significant attempt to ensure that UK industry and academia caught up with the US and Japanese lead in IT. Alvey funded pre-competitive collaborative research, often involving academic and industrial partnerships, with the academic element being met by additional funding from the Science and Engineering Research Council. Soon SERC (later EPSRC) and the other research councils were launching further schemes to encourage collaboration with industry, and many of these were brought together under the LINK programme of the late 1980s and into the present.

Also during the 1980s there was a growing awareness of the potential role of universities in economic development through better exploitation of their knowledge base. This was either by transferring expertise and inventions to the private sector to enhance growth opportunities, or by establishing new companies to exploit the ideas that were perceived to be emerging from universities. As a consequence there was a rapid growth of science parks and technology transfer agencies and initiatives, in part driven by the need for universities to seek new revenue-generation opportunities, but also driven and funded by national and regional stakeholders keen to see a benefit for the UK and its local economies.

2.2 Forms of interaction

As HEIs have developed links with business over recent years, the forms of those links have become more varied and sophisticated. New public programmes have been introduced to stimulate different approaches, and individual HEIs have initiated new schemes.

The types of interaction can be grouped into four broad categories (Charles and Howells, 1992), albeit that there may be overlaps and interactions between them:

- **Research-based services** – focused around the creation of new knowledge through sponsoring research projects and collaborating in the use of scientific and technical facilities.

- **Exploitation of existing knowledge** – incorporating the application of codified knowledge in the form of patents and copyright, as well as the application of knowledge and expertise through consultancy.
- **People-based mobility and exchange schemes** – including the exchange of students and personnel between the HEI and the companies, as a means of transferring knowledge.
- **Spin-offs and forming new companies** – including schemes to encourage graduates to establish companies and support infrastructures such as science parks and incubator units.

Research is a central activity of higher education in the UK, with the sector accounting for 20% of total UK R&D effort. A significant amount of this is funded through competitive grants and contracts, mainly provided by government, but with a proportion from business organisations. Such contract research activity is growing in most advanced countries, promoted by government encouragement and support, but also by trends towards the greater externalisation of contracting out research.

Our concern in this study is two-fold: direct research commissioned, funded and to the benefit of business, and collaborative research funded by the government in which business is a beneficiary. The nature of the different funding mechanisms is further explained in section 4.

The business sector has traditionally relied upon HE and public funding for the basic or fundamental research likely to underpin future market opportunities, although the true relationship between basic research and commercial product development is more complex and interactive. However, the relationship between government, industry and HE has arguably become more complex in recent years. Government has withdrawn from direct support for R&D in individual businesses in favour of funding collaborative work within universities where business also makes some contribution. In parallel there have been shifts within HEIs to activity that is more closely related to the needs of business, prompting concerns that business should be paying the full costs of research. Consequently we have seen growth in the numbers of research-only staff in HEIs, typically on project-related contracts, and an associated growth in externally-oriented research units focused on the needs of particular business sectors. This emergence of a research enterprise culture in HE also feeds into the question of commercialisation of intellectual property (IP).

Within the UK in recent years there has also been an intensification of the policy pressure on universities to commercialise their knowledge, and a reshaping of policy regimes to encourage this. Central to concerns about IP and spin-offs is the question of legal rights to IP, an area in which the UK law and practice of exerting ownership of IP within an academic context is highly permissive.

There are several stakeholders in the process of developing potentially exploitable IP within universities. They include the members of the research team that take the inventive step, the university which employs the individuals and may exert rights through contracts of employment, the funders of research (often government through general university funds and also specific programmes, but also charities and other bodies), and the local community served by the university. Leaving aside the issue of contracts from companies which exert rights to the IP, the question of ownership is central to appropriation and whether society in the form of the state, local community

or the university benefits from the commercial exploitation (Charles and Howells, 1992).

During the 1980s there were major shifts in policy in the UK concerning the routes by which IP could be exploited, although the basic rights were largely unchanged. Prior to 1985, rights of first refusal on publicly-funded research IP went to the National Research and Development Corporation (NRDC), later renamed the British Technology Group (BTG), and royalties were split with the university. Universities could though exploit anything that NRDC refused. Subsequently, with the abolition of the NRDC/BTG monopoly, universities were free to develop their own strategies for commercialisation, but could still use BTG as one route (Charles and Howells, 1992; Harvey, 1996). A wide variety of in-house and collaborative mechanisms have since developed to encourage commercialisation activity and manage the process.

From the early 1980s there have been a growing number of Industrial Liaison Officers (ILOs) in universities, and the parallel development of science parks and other incubators, university companies, and consultancy organisations, all of which have played different roles in the exploitation of academic knowledge, mainly on a more local scale (Charles et al, 1995).

2.3 Public programmes to encourage HE-business interaction

The public policy landscape supporting HE-business interaction has become considerably more complex in recent years, through a combination of growth in national schemes targeted at universities, increased participation of universities in regional and regeneration programmes, and the effects of devolution through the establishment of parallel but distinct schemes in the devolved nations.

A core set of grant schemes and programmes to promote collaborative research, graduate placement and teaching companies has been in operation for many years. These have been accompanied more recently by the development of what is expected to become a permanent ‘third strand’ of funding for outreach and entrepreneurial activity.

Following the DTI White Paper in 1998, ‘Building the Knowledge Driven Economy’, funding was provided for the establishment of 12 Science Enterprise Centres through the SEC. They provide a focus for commercialisation and entrepreneurship, aimed at both academic staff and students through the introduction of enterprise into the curriculum. Associated with this programme, the University of Cambridge joined forces with MIT to establish a Cambridge-MIT Institute (CMI) to promote the international transfer of expertise in commercialisation. In parallel, the University Challenge (UC) initiative was established with funding from the Treasury, the Wellcome Trust and the Gatsby Charitable Foundation. UC awarded grants to a limited number of institutions (some operating in collaboration), establishing rolling funds to support commercialisation projects through seed funding. SEC and UC were both national initiatives.

In England and Northern Ireland, this selective approach was accompanied by the Higher Education Reach Out to Business and the Community (HEROBC) Fund which aimed to provide support to the majority of HEIs for the further development of business interaction. HEROBC was launched during 1999 with a first tranche of £60 million awarded for three-year projects in 87 institutions or consortia. A second round

of funding in 2000 resulted in a further 50 awards totalling £22 million. The second round covered many of the institutions that were unsuccessful in the first round, but also included 11 collaborative projects.

Further developments have followed in 2001 with the DTI/DfEE White Paper, 'Opportunity for All in a World of Change'. This launched a new initiative to establish University Innovation Centres – large, regionally-based, research and innovation centres often focused on collaboration between HEIs. The University of Newcastle upon Tyne is leading a nanotechnology centre with the other North-East universities for example, but also involving BAE Systems and Procter & Gamble. In parallel, a number of New Technology Institutes are being established to support advanced skills development in the regions.

As part of the shift towards a more permanent structure for third strand funding, HEROBC has now been subsumed into a new HEFCE programme, the Higher Education Innovation Fund (HEIF), which is being launched alongside final calls under the SEC and UC programmes. Subsequently it is intended that HEIF will be the main vehicle for core funding for business interaction, incorporating University Innovation Centre projects.

The situation in Scotland and Wales under devolution and with their own funding councils is somewhat different. Although eligible under SEC and UC as UK-wide initiatives, Scotland and Wales have had their own programmes to encourage HE-business interaction.

In Wales HEFCW has made funds available since 1995/96 to encourage and support training and consultancy services (TACS) provided by Welsh HEIs to industry, commerce, the professions and the public sector. Since 1998 funding has been allocated pro-rata to the average income received in the form of non-research TACS income over the previous two years, and release of funds to HEIs is subject to the receipt of a satisfactory business plan. Since 2000/01 Welsh HEIs have also been required to submit a business plan prior to the release of formula-based funding for their contract research (CR) activities. However from 2002/03 onwards HEFCW will be merging TACS and CR allocations into a permanent stream of funding, together with some graduate employability initiatives, to support institutions' overall knowledge transfer activities. The new fund will be known as the Higher Education Economic Development (HEED) Fund and the Council intends to develop this over time into a substantial third strand of core funding.

HEFCW also has a history of collaborative activity with the Welsh Development Agency (WDA) and the National Assembly for Wales in support of economic development. Jointly funded programmes include the Wales Spinout Programme, Know-How Wales, Graduate Wales, and the Centres of Excellence for Teaching and Industrial Collaboration Programme. With its sister funding body for further education, the National Council for Education and Training for Wales, HEFCW is also promoting a Knowledge Exploitation Fund. This is worth £34 million of Welsh Assembly support over four years starting in 2000/01 (with the potential to exceed £60 million with the support of the European Social Fund).

Scotland has been providing support for commercialisation activities and helping to meet the research needs of the Scottish economy over a number of years. An example of the perceived importance of commercialisation can be seen in an enquiry into the commercialisation of public sector science and technology by Scottish Enterprise and

the Royal Society in Edinburgh (SE/RSE, 1996). In order to meet Scottish Enterprise's objectives of increasing employment, prosperity, competitiveness and economic growth, attention was focused on commercialisation in support of existing firms, and through the establishment of new spin-off firms. The enquiry suggested that by increasing the creation of spin-offs from a rate of 60 over the previous 10 years to 150 in the following 10 years, an additional 3,500 to 4,500 jobs could be generated. The primary mechanism for this was to be through a range of proactive support policies, but also through more structural changes within the university system.

What emerged from this review was the Technology Ventures Initiative within Scottish Enterprise, and later CONNECT, a scheme to network together venture finance and other business support agencies to encourage the formation of new technology-based firms, especially from within the universities. SHEFC has contributed to both the Technology Ventures Initiative and CONNECT, but has also directly funded commercialisation activities in the universities through a number of other programmes.

In 1997/98 SHEFC introduced the Research Development Grant in response to the national Foresight Programme to provide a submission-based grant scheme to build research infrastructures for new areas of research relevant to Scotland's long-term economic needs. In parallel, SHEFC developed a Professionalisation of Commercialisation grant scheme to help improve the management of research commercialisation. This has subsequently been merged with the Council's fund for Continual Professional Development to form the Knowledge Transfer Grant. In view of the high priority placed on this by the Scottish Executive in its report on the knowledge economy in February 2001, the grant is being introduced earlier than planned, with additional funds giving £6 million for allocation in 2001/02. This new grant is formula-based and a permanent stream of funding.

In addition to these initiatives by the HE funding bodies, HEIs are increasingly involved in regionally-based initiatives which assist the development of commercialisation and business interaction activities. These include the European Structural Funds distributed through regional partnerships, urban regeneration activities under the Single Regeneration Budget and equivalents in the devolved nations, schemes from the former Training and Enterprise Councils (now under the Small Business Service) and local authority initiatives.

The European Regional Development Fund is worth special mention as the European Commission has been keen to encourage regional partnerships to include elements in their programmes for technology transfer, new technology-based firms, and technical advice to small and medium enterprises (SMEs) – whether on innovation, IT or sustainability. Within such programmes, HEIs have been key delivery agents and have been active participants in the design and management of the programmes. Many of these programmes involve the delivery of free advice to firms, and are therefore not always captured by conventional performance indicators which focus on the financial inputs to the HEI. More detail is provided in section 9 of this report.

The policy framework of HE-business interaction in the UK is thus more supportive than at any time in the past and has been particularly strengthened since 1999/2000. The report that follows focuses on the situation up until that point, providing a baseline figure for the UK's HEIs before the introduction of significant additional funding, but with the benefit of a broadly supportive environment during the 1990s.

3 Institutional strategies

The nature of the interaction between HEIs and business is substantially shaped by the nature of institutional strategies and priorities. Clearly these strategies are themselves a consequence of historical developments and the accumulation of specific resources and assets. Hence different types of institution tend to develop strategies for business engagement that build on their strengths and fit with broader institutional missions. In this sense there is no one model for business interaction: research-based universities will develop a different approach from a university focused more on the lifelong learning needs of its immediate locality.

This plurality has been recognised in the approach to support for business interaction within the funding bodies. Recent programmes of funding have provided support for a range of mechanisms, and in the case of HEROBC for the development of specific institutional strategies that meet the needs of an individual HEI and its particular business partners or regional context.

3.1 Contributions to economic development

In order to examine this diversity of priority and approach, HEIs were asked a number of questions about their overall institutional strategy and approach to business interaction. A number of different forms of contribution were identified and listed for HEIs to select from, covering aspects of the teaching and research missions relevant to economic development, but also including issues such as community development, partnership building and strategic analysis of the local economy. Institutions were able to indicate all those that they felt were appropriate to them, and those elements that were the top three in their case.

The majority of HEIs indicated that most of the forms of contribution were relevant to them in terms of their contribution to economic development, with only one category scoring below 50%. The highest priority was placed on access to education, followed rather surprisingly by supporting SMEs, and developing local partnerships. The lowest scores were for strategic analysis of the regional economy, attracting inward investment, community development and local graduate retention.

However the pattern of response is slightly different for the 'top three' contributions for each HEI. Access to education is again the highest scoring, although this time only 51% of HEIs included it. The next highest were research collaboration with industry, and technology transfer. Support for SMEs falls back to sixth in ranking, perhaps indicating that it is widely recognised to be a priority of public policy and hence a good thing to be doing, but that it is not necessarily a high priority for the majority of HEIs. It is a necessary element in the menu but in practice perhaps presents problems for implementation.

Table 3.1 Areas in which the HEI is seen as making a contribution to economic development (percentages of survey respondents)

	Appropriate contribution (%)	Rank	Top three greatest contribution (%)	Rank
Access to education	91.5	1	51.4	1
Graduate retention in local region	70.9	10	15.2	8
Technology transfer	80.1	7	42.8	3
Supporting SMEs	90.1	2	24.6	6
Attracting inward investment to region	61.0	12	7.2	12
Research collaboration with industry	81.6	5	44.2	2
Strategic analysis of regional economy	44.0	13	0.7	13
Attracting non-local students to the region	79.4	8	12.3	9
Support for community development	69.5	11	9.4	11
Developing local partnerships	85.8	3	21.7	7
Management development	73.0	9	11.6	10
Meeting regional skills needs	82.3	4	26.8	5
Meeting national skills needs	81.6	5	29.7	4
No. of cases	141		138	

Source: HEBI survey 2001

It is clear however that different types of institution tend to see their contribution to economic development in different ways. HE colleges, for example, score much higher than universities on meeting regional skills needs, developing local partnerships and supporting community development. Post-1992 universities tend to focus on access to education, the retention of graduates in the region, meeting regional skills needs and supporting SMEs. This is evidence of a more strategic orientation to the region. Pre-1992 universities, by contrast, emphasised meeting national skills needs more than regional skills needs, and as might be expected are more focused on research collaboration with industry and technology transfer.

Interestingly, older universities also emphasised attracting inward investment more, which perhaps reflects on the perceived value of the research base for multinational firms.

Table 3.2 Areas in which the HEI is seen as making the three greatest contributions to economic development (percentages of survey respondents)

	Pre-1992 university	Post-1992 university	HE college
Access to education	29.5	82.9	57.1
Graduate retention in local region	11.5	22.9	14.3
Technology transfer	60.7	45.7	14.3
Supporting SMEs	8.2	40.0	35.7
Attracting inward investment to region	13.1	0.0	4.8
Research collaboration with industry	73.8	17.1	23.8
Strategic analysis of regional economy	1.6	0.0	0.0
Attracting non-local students to the region	13.1	8.6	14.3
Support for community development	1.6	2.9	26.2
Developing local partnerships	19.7	20.0	26.2
Management development	11.5	5.7	16.7
Meeting regional skills needs	11.5	37.1	40.5
Meeting national skills needs	39.3	17.1	26.2
No. of cases	61	35	42

Source: HEBI survey 2001

On a regional basis the variations were not particularly significant, except that in the 'greater South-East' grouping there was a lower rating overall for graduate retention and technology transfer, and a higher rating overall for meeting national skills needs. The dynamism of the London and South-East economy seems to play a role here, in that HEIs are under little pressure to try to retain graduates within the region as it is a massive importer of graduates from other regions. These other dimensions relate to strong regional policy, and are hence less likely in the South-East, plus this region has a higher proportion of respondents from HE colleges.

3.2 Regional economic development

The economic development of the local region is of continuing importance to HEIs. Almost 60% said that it was a high priority within their institutional mission, and only 7% said it was a low priority. This compares with previous CURDS surveys in 1993 and 1997, which used the same question (although on previous occasions restricted to universities only). In 1997 the figures for universities were very similar to the current

survey, with older universities tending to score a little lower and new universities a little higher, but the difference between the two surveys was not really significant.

Economic development tends to be a higher priority for post-1992 universities: over 86% rated it so, compared with just over 50% of older universities and 44% of HE colleges. None of the post-1992 universities rated economic development as a low priority. Even within the older universities there was only one broadly based institution that gave a low priority to the economic development of their region, and all the others indicating a low prioritisation were specialist institutions.

Table 3.3 Importance of economic development of the region in the institutional mission (universities only, percentages)

	1997 survey	2001 survey
High priority	61.5	64.9
Medium priority	33.7	30.1
Low priority	4.8	4.2

Source: CURDS survey for DfEE 1997, HEBI survey 2001

Table 3.4 Importance of economic development of the region in the institutional mission (percentages of survey respondents)

	Pre-1992 university	Post-1992 university	HE college	Total
High priority	50.9	86.5	44.2	58.4
Medium priority	42.1	13.5	44.2	35.0
Low priority	7.0	0	11.6	6.6
No. of cases	57	37	43	137

Source: HEBI survey 2001

Regionally also there was some variation, with HEIs in the South-East grouping being more inclined to rate economic development as a low priority (9.8%, all specialist institutions from London) or a medium priority (47.1%). In the other three regional groupings over 60% of HEIs regarded economic development as a high priority. Again this accords with the results for 1997.

The nature of the local region here is not unproblematic, however. Only 42.8% of HEIs identified most strongly with the RDA area or devolved 'nation' as the greatest priority in the mission. A further 39.1% chose an area defined by the university, either at a sub-regional level or cutting across regional boundaries. What is perhaps more interesting is the differences here between groups of regions. Taking the four main groupings of regions, there is considerable commonality within these groupings but distinction between them. HEIs in London and the South-East do not strongly identify with government-defined regions, but tend to work at the level of the immediate locality or some other area defined by the HEI, usually consisting of a group of

counties around the HEI. In the Midlands and South-West there are some HEIs that identify most strongly with the region (although not in the East Midlands), but a slightly higher number tend to focus on their own defined area. Finally, in the northern English regions and in the devolved territories the strongest identification is with the regional or devolved national identity, with a few identifying most strongly with their own defined area.

These characterisations of HEIs as addressing particular ‘regions’ must however be seen within the wider context. HEIs are complex institutions with a variety of spatial orientations. Regional interactions are only one element within a broader pattern of national and international activities and partnerships, a pattern which will vary considerably from one institution to another. There is no intention here to imply that the regional focus of institutions should be predominant in their strategy, but simply to identify the extent to which HEIs currently identify strongly with particular sub-national territories such as RDA areas, local authorities or some other areas. Even though at the institutional level there may be a strong identification with a particular region, this may not be common across all the activities of the HEI. As we previously noted (Goddard et al, 1994) regional interactions are necessarily multi-scale, and for different purposes and different activities HEIs tend to use alternative regional definitions, depending on the specific partner, on the presence of competing HEIs, and on the natural service territory or market for a particular activity.

Table 3.5 Regional or local unit considered of greatest priority in the institutional mission (percentages)

	L/SE/E	WM/EM/SW	NE/NW/YH	S/W/NI	All
Regional/local area not of any significance to mission	9.8	3.3			4.3
Government region/RDA area	21.6	43.3	60.7	62.1	42.8
County	3.9	3.3	10.7	3.4	5.1
Locality – city, town or rural district	17.6		3.6	6.9	8.7
Area defined by the HEI (e.g. surrounding counties)	47.1	50.0	25.0	27.6	39.1
No. of cases	51	30	28	29	138

Source: HEBI survey 2001. Regions: London (L), South-East (SE), East; West Midlands (WM), East Midlands (EM), South-West (SW); North-East (NE), North-West (NW), Yorkshire and Humber (YH); Scotland (S), Wales (W), Northern Ireland (NI)

3.3 Focus on particular sectors

Many HEIs are focusing on particular sectors in their business interaction. Such a focus might build from particular research strengths or the overall orientation of an institution towards particular disciplines and hence industries. Institutions seeking to

build a focus for their interaction with business often target particular sectors or clusters as a means of directing and differentiating their efforts. In some cases the orientation will be obvious – a college of agriculture or a medical school – whilst in others a general purpose university might decide to focus on a local industrial strength, such as automotive engineering in the West Midlands or oil and gas extraction in Aberdeen.

Almost all HEIs indicated some form of sector focus, although the nature of the response indicated that some were able to make a more considered response than others. Several forms of response could be identified. Many of the sectors suggested were fairly predictable knowledge-based sectors or clusters. A total of 48 HEIs identified biotechnology, life sciences or pharmaceuticals as one of their three most important sectors, and 52 HEIs identified various permutations of information and communication technologies, digital technologies, new media or telecommunications. Cultural and creative industries were popular, with 35 mentions, and various engineering sectors were also frequently mentioned (electronics 16 times, aerospace and automotive 15 times each, and more general engineering 17 times). Agriculture, land-based industries and the food chain were mentioned by 19 HEIs, and healthcare was identified by 20.

Another group of respondents focused on very specific sectors that were highly local: oil and gas for both of the Aberdeen universities, motor sport for Oxford Brookes, and automotive for Coventry and Warwick for example.

A third form of response was a rather unspecific or vague mention of ‘manufacturing’, ‘business and professional services’, ‘business’ or even ‘SMEs’. Clearly for these HEIs there is no sharp focus for their activities, although for some this was a catch-all term following a more specific primary focus. It does raise some concerns though that some institutions have not thought through whether or not their business interaction ought to be focused. In the case of institutions simply identifying ‘SMEs’, there is no unifying form of demand as SME characteristics and demands are almost infinitely variable, and this reveals a naivety. The institutions mentioning this were all HE colleges; in general most of the responses where an inappropriate term was used came from colleges. Other responses in this group included ‘corporate’, ‘companies’, ‘management in SMEs’, and ‘business in the community’. One institution referred to ‘enabling technologies’, which seemed to refer back to their own activities rather than the sectors on which they focused.

A fourth response was to identify a focus within the public sector or community, even though the questionnaire asked for business sectors or clusters. Such an orientation may be entirely appropriate – not all HEIs need to be focused exclusively on interaction with business – but this specific study looked only at the business sector. HEIs identified ‘education’, ‘local government’, ‘international agencies’, ‘applied social science’, ‘VSO and not for profit’, and ‘community development’. As already noted, healthcare was frequently mentioned. Again many of these institutions were more specialised and frequently were HE colleges, and as such may be primarily focused on public sector activities. This fits with other comments from institutions that the questions were too focused on private sector activities when much of their interaction was, for example, with the NHS.

The questionnaire also asked for the reasons behind the choices of sector focus. This was largely driven by the existing strengths of the HEI and demand from the companies themselves. External factors such as RDA strategies or perceived market

gaps were much less important. Thus HEIs are making their choices on a highly rational if internally-driven basis.

Table 3.6 How HEIs' priority sectors were selected (percentage of different types of institution)

	Pre-1992 university	Post-1992 university	HE college	Total
The HEI is a specialist institution focused on sector-specific areas	30.0	21.6	76.2	41.7
The HEI took its cue from priorities in RDA regional strategies	35.0	48.6	31.0	37.4
Response to demand from companies in these sectors	68.3	75.7	59.5	67.6
The HEI identified important business clusters in its region	48.3	75.7	38.1	52.5
These sectors had best fit with the institution's expertise	91.7	91.9	66.7	84.2
The HEI focused on a 'gap in the market' left by other HEIs	3.3	27.0	21.4	15.1
Other	6.7	10.8	4.8	7.2
No. of cases	60	37	42	139

Source: HEBI survey 2001

It is evident from Table 3.6 that all universities were driven by institutional factors, though post-1992 universities were slightly more likely to follow RDA priorities and to identify important clusters in their region. The HE colleges were more likely to consider themselves to be specialist institutions focused on sector-specific areas.

The selection of sectors or clusters varied also by region to some degree. One particular institutional variation between regions was the effect of RDAs. These seemed to be considerably more influential in the North and Midlands, presumably because of their role in new regional cluster policies backed up by the promise of resources such as the European Regional Development Fund (ERDF). In the northern English regions a slightly higher proportion of institutions identified demand from particular companies as driving their strategy, and the selection of sectors that fit with the institution's expertise, but overall there seemed to be a stronger response to sector needs across these regions.

Some regional differences are also affected by the nature of institutions: a higher proportion of HEIs in the South consider themselves to be specialist institutions and therefore have a more focused orientation.

Table 3.7 How HEIs' priority sectors were selected (percentage of HEIs in each region)

	NE/NW/YH	WM/EM/SW	L/SE/E	S/W/NI
The HEI is a specialist institution focused on sector specific areas	35.7	43.3	50.0	31.0
The HEI took its cue from priorities in RDA regional strategies	53.6	56.7	25.0	24.1
Response to demand from companies in these sectors	75.0	63.3	69.2	62.1
The HEI identified important business clusters in its region	53.6	53.3	53.8	48.3
These sectors had best fit with the institution's expertise	92.9	86.7	78.8	82.8
The HEI focused on a 'gap in the market' left by other HEIs	14.3	13.3	13.5	20.7
Other	7.1	13.3	3.8	6.9
No. of cases	28	30	52	29

Source: HEBI survey 2001. Regions: North-East (NE), North-West (NW), Yorkshire and Humber (YH); West Midlands (WM), East Midlands (EM), South-West (SW); London (L), South-East (SE), East (E); Scotland (S), Wales (W), Northern Ireland (NI)

3.4 Benchmarking institutional strategies

HEIs were asked to grade their institution using three benchmarking questions: on their strategic plan for business support, the level of incentives for their staff to engage with industry, and their involvement with regional skills strategies. These benchmarking questions were initially developed as part of a separate project for the HEFCE on the regional contribution of higher education, with the intention that they could be used within institutions for self-assessment and as part of internal strategy reviews.

The questions were intended to be applied within an institutional benchmarking process, whereby a range of staff came to a consensus position on the response, and where some external validation would also be possible based on discussions with partner organisations. In the questionnaire, responses were mainly made by individuals or following discussion among a senior management team. It is therefore our expectation, judging by some of the individual responses, that there has been a varied degree of objectivity in the response to these questions, with some institutions perhaps being a little aspirational in their replies. The responses should therefore be seen as the perceptions of the institutions as to their practices rather than an objective measure. The true value of such benchmarking questions lies more with the process of reaching an internal consensus and on there being an external challenge to the organisation's internal perceptions.

In each of these questions, responses were required on a scale from 1 to 5, with 5 representing good practice. Specific descriptions were provided at points 1, 3 and 5, so responses will be largely discussed according to the numerical values rather than the more extensive descriptions provided.

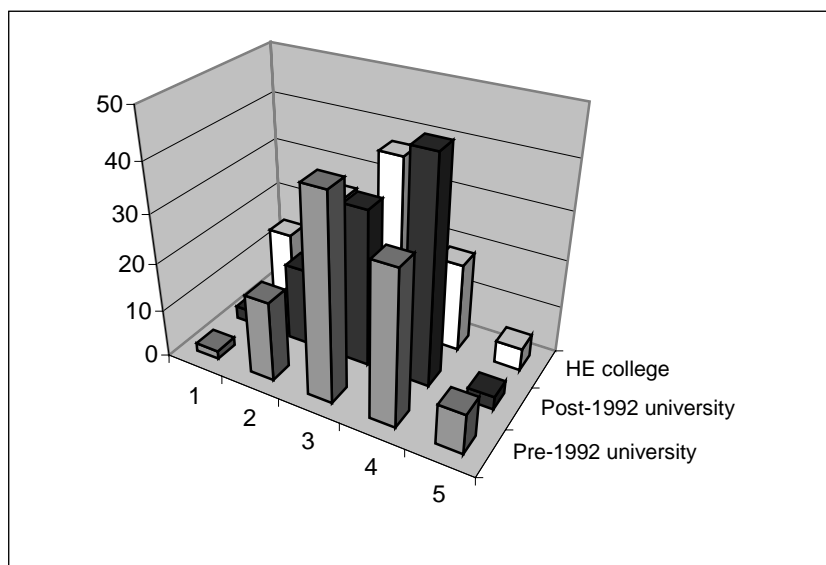
3.4.1 Strategic plan for business support

The first of the benchmarking questions asked HEIs about the extent to which they had in place and had fully implemented a strategic plan for business support. The benchmarking grades below offered a possible scale: from 1 where the institution had no strategic plan at all and was engaging in a very ad hoc manner, to 5 where it had a well developed plan that was fully implemented and embedded in the culture of the institution.

1	2	3	4	5
No strategic plan in place. Ad hoc approach to business support.		Strategic plan developed and only partially implemented, or restricted to certain departments or central functions.		Strategic plan developed as a result of an inclusive process across the whole HEI. Accepted across almost all units and recommendations implemented. Use of plan to set targets and monitor achievement.

The results are presented in Figure 3.1 for the three main types of institution, showing the percentage of each at the five reported levels. The majority of institutions peak around the modal value of 3, rising to 4 for the post-1992 institutions: 45.9% of post-1992 universities chose level 4 compared with 31.7% of pre-1992 universities and only 18.6% of HE colleges. For HE colleges this is understandable given the presence of small specialised arts colleges and the like.

Figure 3.1 Existence and implementation of strategic plan for business support (percentages of each grouping)



Source: HEBI survey 2001

When the sample is analysed by region there are no substantial differences between the English regions. However in the devolved territories there was a more bifurcated distribution, with the majority scoring 4 (40%), followed by category 2 (30%), and with category 3 lagging behind (20%).

3.4.2 Involvement in regional skills strategies

The second benchmarking question focused on the extent to which the HEIs contributed to the development and implementation of regional skills strategies. Here the benchmark prompted consideration of both the role of HE senior staff in regional partnerships and the extent to which the institution brought other resources to bear, such as a capability to apply its expertise and access to data. Again the questions and scale used are replicated below.

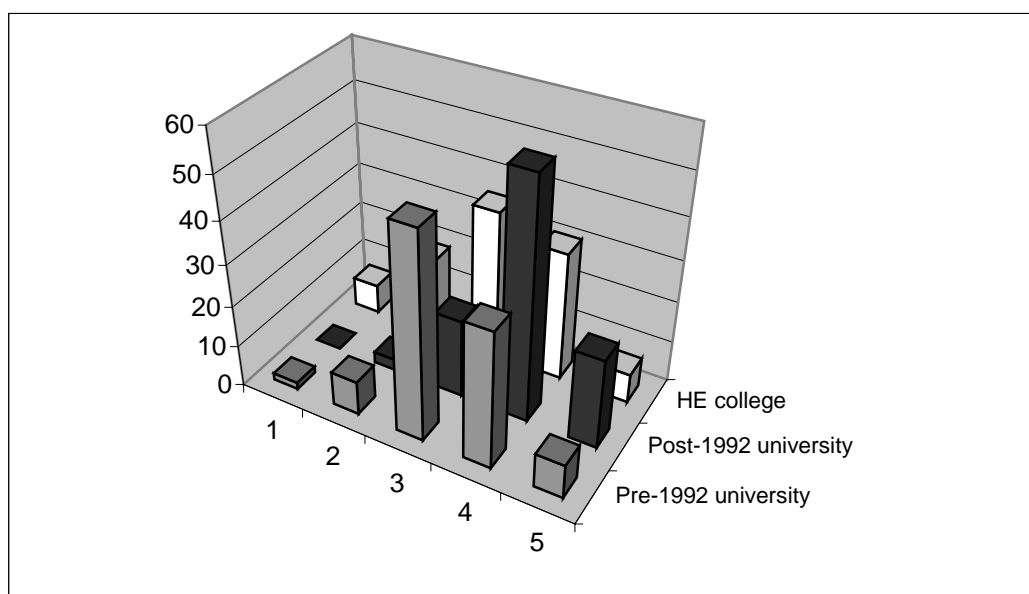
1	2	3	4	5
<p>Passive response to skills strategies.</p> <p>No involvement in steering committees, no provision of data or expertise. No attempt to influence or respond to strategy during consultation.</p>		<p>Some engagement with regional partners and provision of expertise and data, but approached as a narrow sector-specific interest.</p> <p>Involvement from officers with defined role rather than leadership inputs.</p>		<p>Pro-active engagement providing expertise data, interpretation and leadership inputs.</p> <p>HEI seen as a core asset in the region and becomes a central element within the strategy.</p>

Here we see a slightly higher set of scores than in the previous question, with almost equivalence between levels 3 and 4 in the total group (37.1% at 3 and 38.6% at 4).

There is also a relatively large group of institutions scoring themselves at 5, notably among the post-1992 universities. The lower priority placed on contributing to regional skills needs by pre-1992 universities highlighted in an earlier question is reinforced here. This group perceive that their engagement in this area is more from a narrow sector-specific interest involving officers, rather than a strategic and proactive approach expected for best practice institutions. It is evident that the post-1992 universities have sought to position themselves more pro-actively as core partners in regional skills networks.

Again there are some small differences between regional groupings, with a majority of HEIs in the Midlands and South-West grouping clearly opting for level 4, whilst only slightly more institutions in the North-West, North-East, and Yorkshire and Humber category also opt for category 4. The South-East category is focused at level 3. In the devolved territories there is a clear indication that HEIs in Wales and Northern Ireland score themselves higher than those in Scotland.

Figure 3.2 Involvement in the development and implementation of regional skills strategies (percentages of each grouping)



Source: HEBI survey 2001

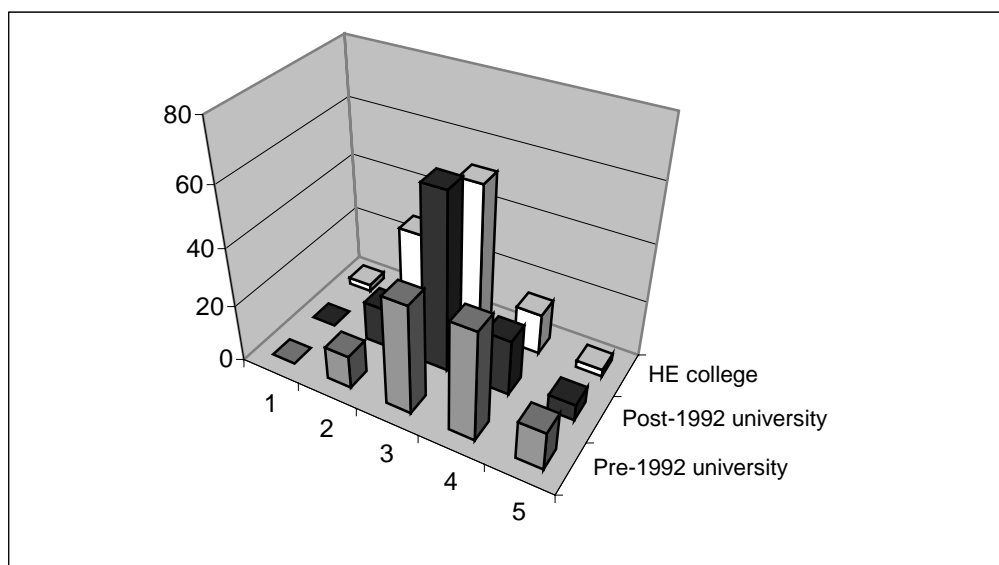
3.4.3 Incentives for staff to engage with business

The third of the benchmarking questions looked at the levels and types of incentives available within the institution to encourage staff to become engaged with business. The focus here was on the existence of clear incentives, which might be financial or related to career progression, and that these incentives were strongly signalled to all staff and well understood. It has been long recognised that the incentives for business engagement are often mixed at best. Many promotion procedures fail to adequately recognise and reward collaboration with business, as opposed to producing traditional academic publications or winning research council grant awards.

1	2	3	4	5
Barriers outweigh any incentives offered. General corporate culture is focused on internal activities and narrow interpretation of teaching and research. Collaboration with industry seen by staff as detrimental to career progression.		Some incentives in place, but with some barriers remaining. Typically policy may be generally supportive but there is a lack of understanding across the institution. Promotions committees still take a narrow focus on research even though guidance suggests industrial collaboration is valued equally.		Strong positive signals given to all staff to encourage appropriate levels of industrial collaboration. Incentive procedures well established and clearly understood and applied.

Unlike the previous two benchmarks, this question saw a more positive response from the pre-1992 universities with equal scores for level 3 and 4, whilst the post-1992 universities were strongly clustered at level 3, as were the HE colleges though to a slightly lesser extent. This result may suggest that the older universities, with greater potential for financial incentives through patent exploitation, and with greater conflicts between the need to achieve research excellence and address business needs, have needed to place more emphasis on recognising and rewarding business collaboration.

Figure 3.3 Incentives for staff to engage with business (percentages of each grouping)



Source: HEBI survey 2001

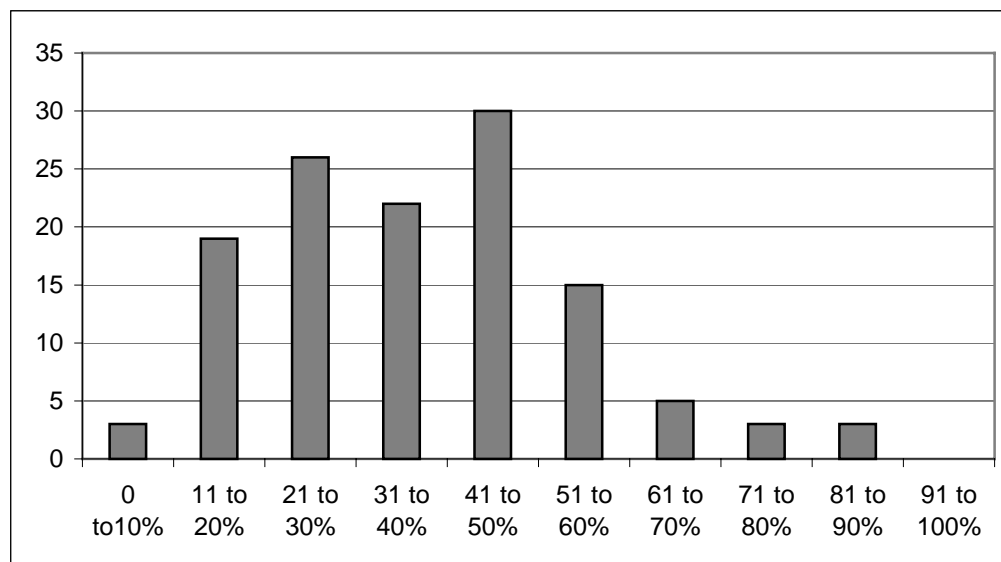
The regional profile of this question is different again from before. Within the English regions the Midlands grouping, the south-eastern grouping and the north of England grouping are all concentrated on level 3, although to a lesser extent in the north of England. By contrast in the devolved territories the sample is mainly split evenly between levels 3 and 4 (40% each), which perhaps indicates the effects of considerable public policy encouragement for rewarding this kind of activity. The Scottish policy on technology exploitation and its recognition of the need for institutional cultural change and incentives may have been influential here.

3.5 Business representation on HEI governing bodies

The strategies and orientation of HE to business, and to other stakeholder interests, can be affected by the governing bodies of the institutions. For this purpose HEIs seek to involve stakeholder representatives on governing bodies to advise and assist in meeting stakeholder needs.

Most HEIs have half the membership of their governing bodies drawn from the business sector. The nature of governing bodies varies between institutions, and notably between the pre- and post-1992 universities. The incorporation of the former polytechnics typically led to smaller boards with greater legal responsibility, whilst pre-1992 universities tended to have much larger councils representing a wide range of local interests. These distinctions are noticeable in the proportion of business representatives: 47% of post-1992 universities have more than 50% representation compared with only 3.7% of pre-1992 universities; and 45% of pre-1992 universities had less than 25% representation. The HE colleges were more evenly balanced: a third had 40-50% of business representation on their governing bodies. From a regional perspective, the institutions in the more peripheral regions were less likely to have high levels of business representation, with most of those with over 50% representation (18 from 26) coming from the Midlands and the South.

Figure 3.4 Percentage business representation on the HEIs' governing bodies



Source: HEBI survey 2001

3.6 Support for interaction with business

The level of support for these activities within the HEI can be judged by the number of staff involved in the commercialisation and industrial liaison function.

Inevitably the HE colleges had quite small commercialisation teams, as most of them are small institutions with limited research activities. What is perhaps more surprising is that some of the pre-1992 universities also have small commercialisation units, and in some cases employ no staff at all in this function. Whilst some of these are specialist institutions, there are a number of mainstream universities, especially among the pre-1992 sector, that employ only one or two staff in this function. This contrasts with those employing more than 20, and in some cases 40, 50 and 60 staff. Some of the universities employing many staff are no larger than institutions employing one or two.

This raises the question of whether institutions with large numbers of commercialisation staff achieve higher outputs. However, there does not seem to be a clear relationship as many of the staff in central liaison functions are supporting diverse missions. Assessment would need to be made across a broad range of outputs, some of which are not included here. Indeed it would seem dangerous to make assumptions about effectiveness based on any set of indicators, given doubts about the inclusivity of indicators and the negative consequences of audit-induced strategies.

Across the sample as a whole, 135 institutions identified a total of 1,217 staff involved in commercialisation activities.

Table 3.8 Number of staff involved in commercialisation and industrial liaison offices (percentages)

No. of staff	Pre-1992 university	Post-1992 university	HE college	Total
0	5.2	0	19.5	8.1
< 2.5	22.4	2.8	48.8	25.2
2.51 to 5	19.0	36.1	22.0	24.4
5.01 to 10	13.8	25.0	4.9	14.1
10.01 to 20	22.4	22.2	2.4	16.3
> 20	17.2	13.9	2.4	11.9
No. of cases	58	36	41	135

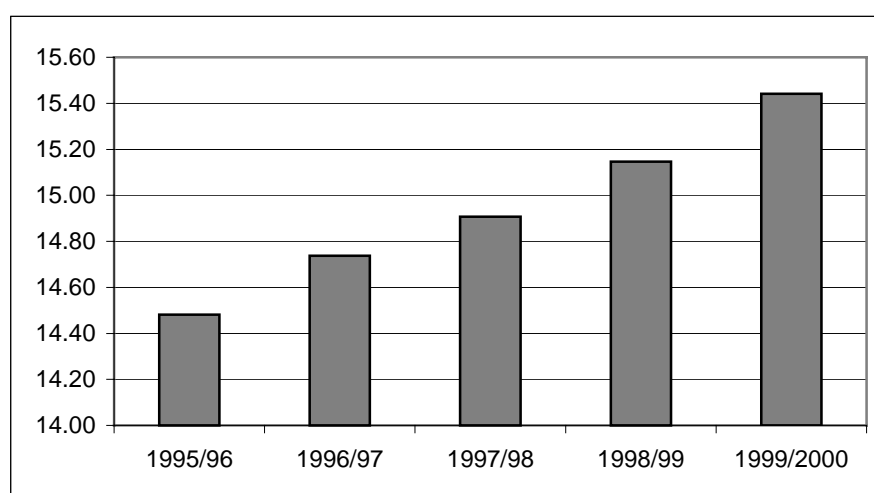
Source: HEBI survey 2001

4 Collaborative research with business

4.1 Research income

The undertaking of externally funded research is one of the core activities of HEIs, and one that has been growing over the past 20 years or so. Just during the latter half of the 1990s, in a period when grants from the UK HE funding bodies were increasing in absolute terms, research grants and contracts continued to grow at a more rapid rate than overall HEI income. From a total of £1.5 billion in 1995/96 and 14.48% of total income, research grants and contracts have increased to almost £2 billion in 1999/2000 and 15.44% of total income (Figure 4.1), a growth rate of 7.7% on the previous year.

Figure 4.1 Growth in research grants and contracts as a percentage of total HEI income



Source: HESA statistics

This income can be viewed in two main dimensions. Conventionally, research income is disaggregated by funding source: UK public sector, industry, overseas, and so on. This allows us to identify that proportion which derives from industrial sources as opposed to government, although overseas industrial income tends to be merged in with projects funded by overseas governments and other bodies.

Another dimension is to consider the distinction between research grants and research contracts. A research grant is typically awarded by government or charitable funding bodies, following a proposal drawn up by an academic researcher within a standard funding framework. Usually the topic of the research is selected by the researcher and the terms and overhead rates are fixed. Research contracts in comparison are usually projects that are in response to a specification by the funding body, often through a process of tendering, and where the terms and overhead rates are negotiated on a project by project basis. This applies to most industrial projects, but also to some public sector projects. In the sections that follow we will draw on both of these forms

of segmenting research income in looking both at research income from business and at the involvement of business in public sector research grants.

Table 4.1 Research grant and contract income of UK HEIs by year and source (£millions)

	UK industry	OST/ Research Councils	UK based charity	UK govern-ment	EU	Other overseas	Other source	Total
1995/1996	169	532	338	269	148	59	38	1554
%	10.9	34.2	21.8	17.3	9.5	3.8	2.4	100
1999/2000	242	604	485	337	167	98	40	1973
%	12.3	30.6	24.6	17.1	8.5	5.0	2.0	100

Source: HESA statistics

The majority of research grant and contract income derives from public sector budgets, and the proportional split for those sources varies little from year to year. The main change in recent years has been a slight increase in the proportion that comes from industrial sources, up from 10.9% in the mid 1990s to 12.3% last year, and a growth in charitable income from 21.8% to 24.6%. Research council and government income has seen relative decline although absolute growth.

It is difficult to make direct comparisons with universities from other countries due to differences in the level of public sector support for university research, and differences in policies on overheads and so on. The Association of University Technology Managers (AUTM) in North America undertakes an annual survey of US and Canadian universities which provides data on research expenditures from industrial sources and total sponsored research expenditures. For 139 US universities, heavily weighted towards the most research active, industrial sources accounted for 9.4% of sponsored research expenditures; for 20 Canadian institutions the proportion was 17.4% (AUTM, 2000). Given the various caveats above, and the more selective nature of the North American survey, the UK position is not dissimilar to that in North America.

4.2 Contract research income from business

In the questionnaire HEIs were asked to provide more detail on the sources of income for the contract research elements of these figures. By contract research we mean research projects that have been requested by the client, as distinct from schemes where the HEI applies to undertake research projects that they have initiated. HEIs were also asked for a breakdown of these figures by regional, UK and non-UK geographic areas.

The response to this question was relatively poor, with a majority of HEIs being unable to provide detailed figures. There was also some ambiguity between the regional and UK totals: some reported virtually no regional income when logic would suggest this was unlikely (in London, for example). The limited response meant that

reporting on the full dataset was of limited value. However, for the sample for which we had good data, we were able to identify the element of the contract research for business that was within the local region, relative to that which was national or international. Sixty-one HEIs were able to produce figures that allowed us to calculate the percentage of research contracts with industry that were with regionally-based firms. However, in a number of cases it was not clear from the HEIs whether a zero return for the region meant no identifiable contracts in the region or an inability to identify a figure for it. We believe that in a number of cases institutions are regarding nationally-oriented firms within the local region as national rather than regional sources. (For example, a London HEI might regard a contract with a multinational company branch based in London as a national contract, whilst a Scottish HEI with a contract with a Scottish branch of the same company might view it as regional.) This may be especially the case within London and the South-East where the perception of the local region as being distinct from a national identity is most problematic.

Table 4.2 Percentage of research contract income from business that originates from the HEI's region (percentages for each grouping)

	Pre-1992 university	Post-1992 university	HE college	Total
0	17.9	5.6	46.7	21.3
0.01-10	28.6	11.1	0	16.4
10.01-20	14.3	11.1	0	9.8
20.01-30	21.4	16.7	0	14.8
30.01-40	7.1	27.8	6.7	13.1
40.01-50	7.1	11.1	6.7	8.2
50.01-60	0	0	0	0
60.01-70	3.6	0	13.3	4.9
70.01-80	0	5.6	0	1.6
80.01-90	0	0	6.7	1.6
90.01-100	0	11.1	20.0	8.2
No. of cases	28	18	15	61

Source: HEBI survey 2001

It is clear from Table 4.2 that for most universities the percentage of research contract income from local business is relatively small. Discounting institutions that reported no research income from business, only 50 institutions gave usable information on income from the region and in total. For this group as a whole, 19% of £129 million total income was reported to be from within the region of the institution. These responses account for around 56% of total reported contract income from business within the surveyed institutions, or 53% of the research income from industry reported to the Higher Education Statistics Agency (HESA). The proportions varied considerably for the different groups of HEIs: only 17.5% of pre-1992 income from

business was reported as being from within the region, compared with 35.9% of post-1992 universities and 75.8% of HE colleges.

4.3 Collaborative research grants

Whilst HEIs currently declare the level of research grant and contract income from UK industry as part of the HESA financial return, this is only a part of the research grant income that involves collaboration with industry. A considerable number of publicly funded research programmes require industrial collaboration, although the precise level of income associated with these has not been monitored in the past.

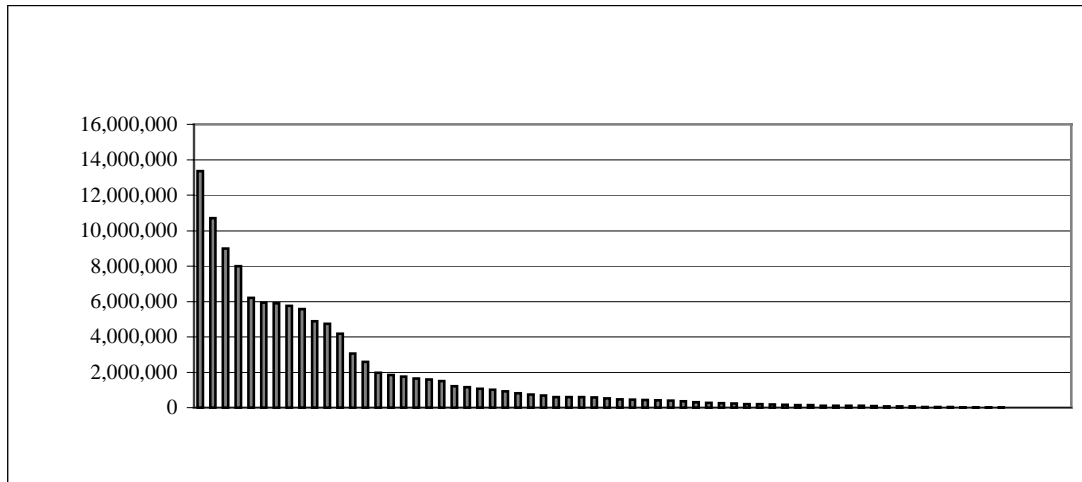
In order to estimate the extent to which public research grants to HEIs involve collaboration with business, the HEIs were asked to identify the income from research councils, other Office of Science and Technology (OST) schemes, the EU Framework Programme and any other public grant schemes where business was involved. In each of these cases HEIs participate in grant applications, where the HEI suggests the research to be carried out rather than responding to a specification drawn up by a sponsor. These sources provide funds that may involve direct industrial collaboration or may be purely academic in nature. In the Framework Programme, for example, most projects involve a combination of academic and industrial partners, with the European Commission providing a subsidy to both, although not the full costs of the research. However, a proportion of Framework Programme projects will involve only academic and public laboratories, and have no business inputs due to the nature of the research task. Hence the value of research grants with business collaboration from these sources will usually be less than the total income from such programmes.

Responses to this question, as with that on regional business income, were quite poor: many HEIs do not have information systems that provide access to the data requested as this information goes beyond existing HESA statistical requirements. Consequently some respondents were unable to provide a figure or were only able to give estimates. Examination of data supplied revealed some significant inaccuracies in comparison with data provided to HESA on research income, and it was not possible to resolve these questions without considerable additional time input from the HEIs concerned.

Figure 4.2 shows the levels of income received by respondent HEIs from research councils, where the projects involved direct collaboration with business. In these cases firms may have provided some additional or matching funds to the HEI, or be a partner in the project. As can be seen in the figure, the distribution is quite peaked, although a number of research-intensive universities were not able to provide data and so it is very much a partial view. Nonetheless the key message is that many HEIs are, in addition to direct research funding from business, undertaking millions of pounds of collaborative research with business funded by research councils.

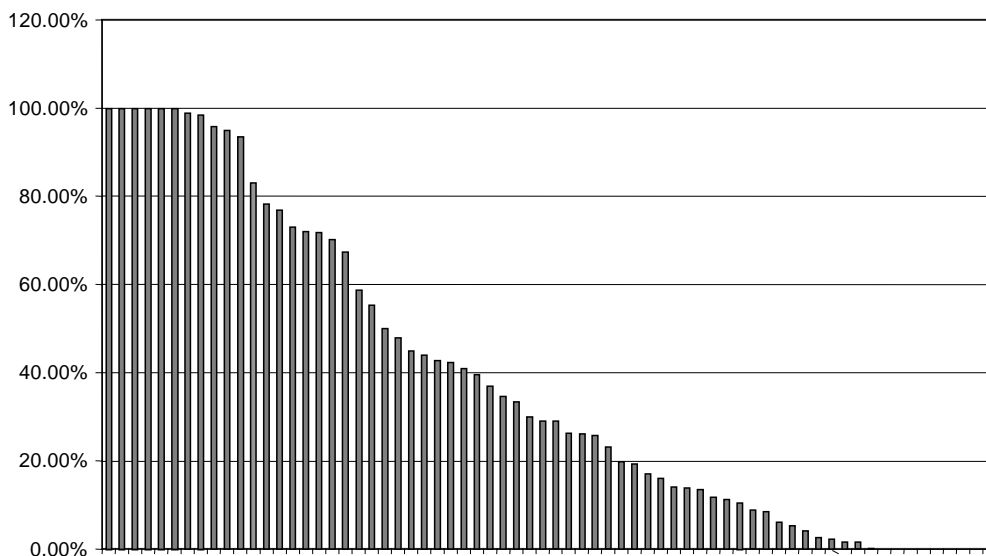
In proportional terms, Figure 4.3 shows the range of percentages for those HEIs which were able to provide usable data on income from OST sources (including research councils) in which there is business collaboration, as compared with total OST income. These can be seen to range from 100% down to zero, although the latter extreme mainly involves institutions with very low OST income, possibly a single project. Taking the mean for the 68 institutions involved, 24.6% of OST projects had business involvement, although for the reasons quoted above this may not be a particularly accurate or representative figure for the sector as a whole.

Figure 4.2 Income from research councils involving business collaboration (absolute values for respondent HEIs)



Source: HEBI survey 2001

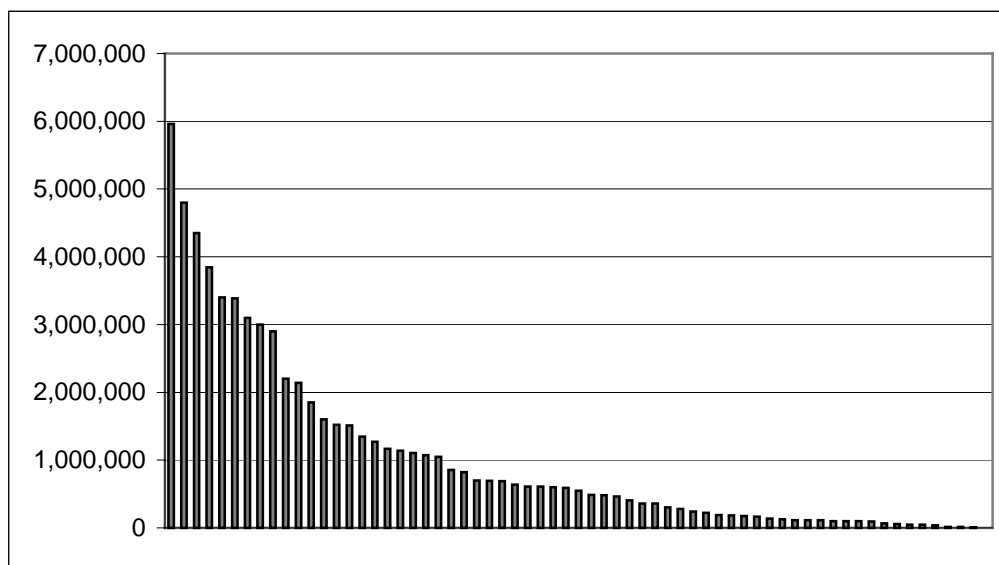
Figure 4.3 Percentage of OST/research council grant income involving collaboration with business (for respondent HEIs)



Source: HEBI survey 2001

Similarly, Figure 4.4 gives the level of income from participation in Framework Programme grants involving collaboration with business. Here, unlike the research council cases, the firms will not usually provide any income to the HEIs but will be subsidised by the European Commission to participate in the projects as a partner.

Figure 4.4 Income from EU Framework Programme involving business collaboration (absolute values for respondent HEIs)



Source: *HEBI survey 2001 (HEIs with zero income excluded)*

4.4 Contracts with SMEs

In the previous section we considered the income associated with research contracts with business. Much of this may be with relatively large and technologically sophisticated firms, but increasingly there is encouragement from government, and through other forms of programme, for HEIs to collaborate more with smaller companies. Not least, the growth of small high technology firms in new science-based sectors creates a potential source of collaborative partners that are well tuned to the ways of HEIs and have interests that fit well with HEI capabilities.

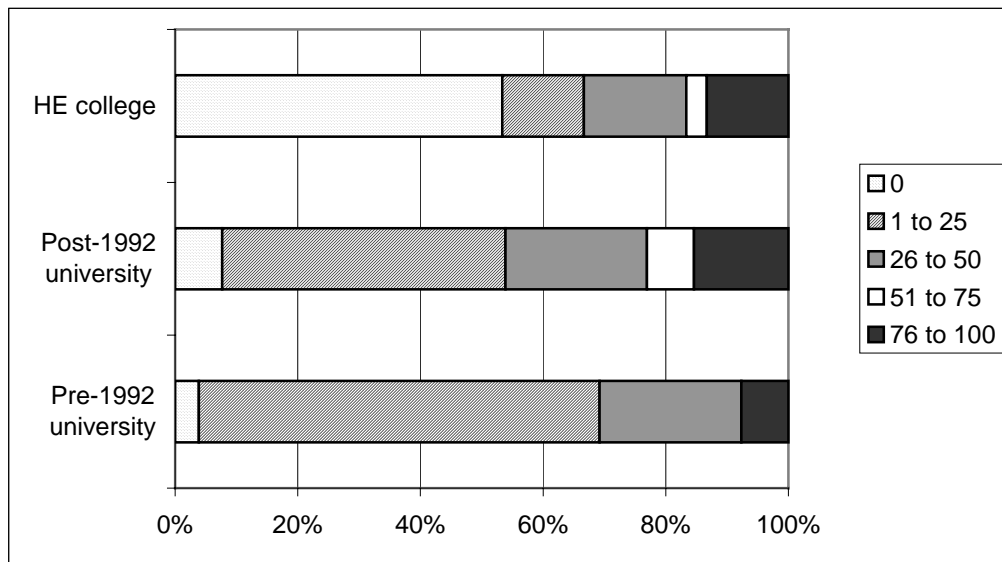
However, when asked about the extent to which research with business involves SMEs, there was again a relatively low level of response. In most cases the databases of research contracts used by HEIs are primarily financial accounting systems, and little information is collected and held centrally on the characteristics of the business. Few HEIs are therefore able to monitor the numbers of firms with which they have contracts that are SMEs. The exception would usually be related to the use of restricted funds such as the ERDF, where only SMEs could be assisted with the benefit of public subsidy. This however is not likely to be an issue where the company is paying for the research, as is the case with this question.

A second limitation concerns the means by which HEIs would identify whether or not a company is an SME. In practice the principal investigator on a project might be expected to know a little about the company, or could ask the company for some information on their status. But previous work has shown that the size of the company is not always clear, and many companies fail to meet the criteria through ownership links, which might not be clear to the principal investigator.

Despite these caveats, 69 of the HEIs in the sample were able to provide a number for the proportion of research contracts which were with SMEs. The response rate was

higher for the HE colleges, although in most cases the result was zero. For the pre-1992 universities the proportion of SMEs was typically low, under 25%. For the post-1992 universities and HE colleges there was a slightly higher proportion where the majority of contracts were with SMEs: 23.1% of post-1992 universities and 16.6% of HE colleges had over 50% of business contracts with SMEs.

Figure 4.5 Percentage of contracts with SMEs – percentage of HEIs of each type

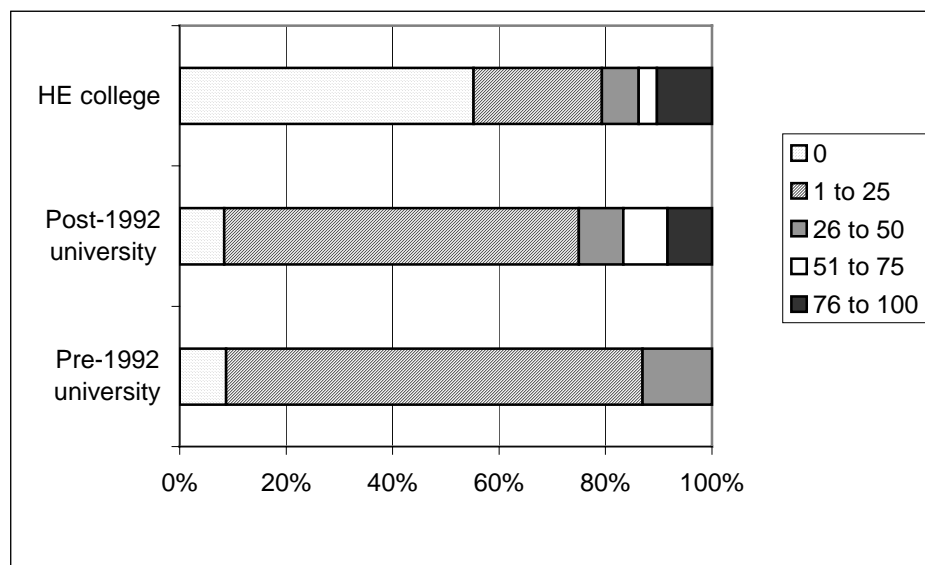


Source: HEBI survey 2001

Taking the results by value, the response rate was even lower, with only 64 responses, and the emphasis was shifted even further to the lower percentages. Again a high proportion said zero – 29.7% of responses – and again the older universities were more concentrated in the under 25% category. Overall though all three groups saw a higher proportion in the 50% and under categories than in the previous question.

For both figures the proportion of institutions reporting zero is likely to be overstated. It is inevitably easier to respond if there are no contracts with SMEs than if there are some. Hence, all of those HEIs which were unable to respond due to inadequate data or excessive time required would be likely to have some SME contracts.

Figure 4.6 Percentage of contracts with SMEs by value – percentage of HEIs of each type



Source: HEBI survey 2001

4.5 Research students and Teaching Companies

Another form of research collaboration involves the use of postgraduate research students on CASE studentships (Co-operative Awards in Science and Engineering), where the cost of the studentship is shared between a research council and a non-academic partner, usually a business. A variant on this is the TCS (formerly the Teaching Company Scheme) where a graduate, usually registered for a higher degree, is employed to work in a company on a research or technology transfer project under continuing supervision from the HEI. These two approaches tend to be well regarded by businesses and are often used by academic staff as a step towards more extensive collaborative research, as the costs for the company are comparatively low, especially for CASE awards. In recent years CASE has been expanded beyond the science and engineering disciplines to encompass social sciences, and a number of CASE awards are now made by the Economic and Social Research Council (ESRC), often for work related to management issues.

CASE awards tended to be particularly concentrated in the old university sector, with none of the post-1992 universities or HE colleges having more than 10 such awards during 1999-2000, and most having none. The highest scoring HEIs have over 100 current CASE awards and are a fairly predictable list of Russell Group and research-intensive universities. The highest reported number for a post-1992 HEI is 8, a number which may be exceeded by a single department in a research-based university (and in some cases even by individual management or social science departments). This broadly reflects the overall distribution of research income.

Table 4.3 Number of CASE awards per HEI 1999/2000

Number of CASE awards	HEIs
0	57
1-10	27
11-25	13
26-50	8
51-75	6
76+	6
All	117

Source: HEBI survey 2001

The total number of awards held by the respondents to the questionnaire was 1,687; 472 were known to be with partners in the same region as the HEI, although not all respondents were able to provide an answer to this. Only 46 HEIs were able to give an answer of one or more, compared with 60 that reported having CASE students.

For TCS, answers were provided by 135 HEIs, of which 87 had at least one TCS programme. Here there was a much more balanced distribution between pre- and post-1992 institutions. There was no significant difference between the two groups in their propensity to access TCS support, and three of the six HEIs with most schemes were post-1992 universities. Very few HE colleges were involved: only five had programmes, three with one each and one with seven programmes. Overall the respondents reported a total of 734 programmes with 824 Teaching Company Associates.

Table 4.4 Number of TCS programmes 1999/2000 (percentage of each group of HEIs)

Number of TCS programmes	Pre-1992 university	Post-1992 university	HE college	Total
0	19.6	2.7	87.8	35.8
1-5	41.1	40.5	9.8	31.3
6-10	10.7	18.9	2.4	10.4
11-15	14.3	18.9	0	11.2
16-20	8.9	10.8	0	6.7
21-30	5.4	8.1	0	4.5
All	56	37	41	134

Source: HEBI survey 2001

Regionally there were no significant differences except that in the South, Scotland and Wales there were a higher number of institutions with no TCS programmes, but

these were mainly HE colleges and reflected the fact that there are proportionately fewer HE colleges in the North of England.

The majority of programmes were reported to be with partners based within the same region as the HEI – 550 out of 734 (although for 51 programmes the region could not be identified).

Table 4.5 Number of CASE studentships and TCS projects by region

Region	CASE studentships	TCS projects	TCS associates
North-East	46	33	35
North-West	278	74	81
Yorkshire	148	68	79
East Midlands	64	40	44
West Midlands	198	91	108
East	24	28	40
London	248	77	84
South-East	218	60	61
South-West	199	71	79
Scotland	193	76	83
Wales	42	62	69
Northern Ireland	29	54	61
Total	1,687	734	824

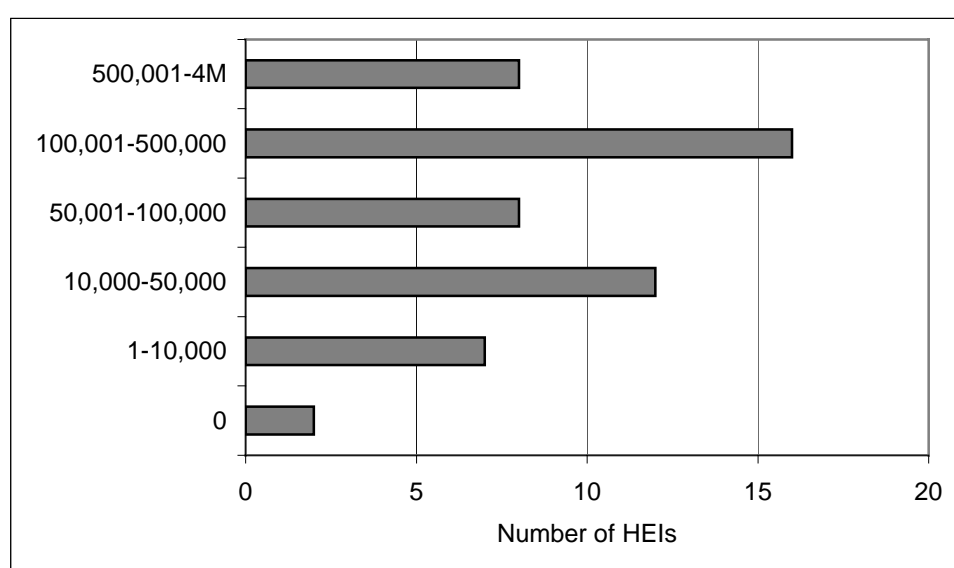
Source: HEBI survey 2001

4.6 Equipment services

Many HEIs provide access to particular forms of equipment for companies, often SMEs: 102 of the respondents indicated that they provided this sort of service, compared with 36 that did not. However, only 53 were able to place a value on this income. Figure 4.7 shows the main categories for these. Whilst there is no clear pattern overall, there seems to be a group of institutions with relatively low levels of income from this activity, typically in the low tens of thousands, often below £20,000. If concentrated in one unit this might pay for the cost of a technician or the support costs of a laboratory, but otherwise it is a very marginal activity where the greatest benefit is to the firms rather than the HEI. We should also recognise here that in some cases funds from other sources such as ERDF might be supporting such services, and provision is made at little or no cost to the firm. The other main group is those HEIs reporting incomes of several hundred thousand and in three cases of one million pounds or more. These are much more significant business activities.

The total value reported by the 53 HEIs able to provide responses was £18,098,771, although 58% of this was accounted for by the five largest amounts and 22% by the single largest. Given the lumpy nature of these figures, it is impossible to estimate what the overall total might be, as a non-respondent might also account for a significant proportion. Indeed as the largest amounts were recorded by members of the Russell Group, but many of this group were unable to provide a figure for this source of income, it is likely that the real aggregate is much higher – perhaps by a factor of three or more. However, there is no robust method for calculating this on the basis of the information provided.

Figure 4.7 HEIs providing equipment-related services classified by income (£) from these activities



Source: HEBI survey 2001

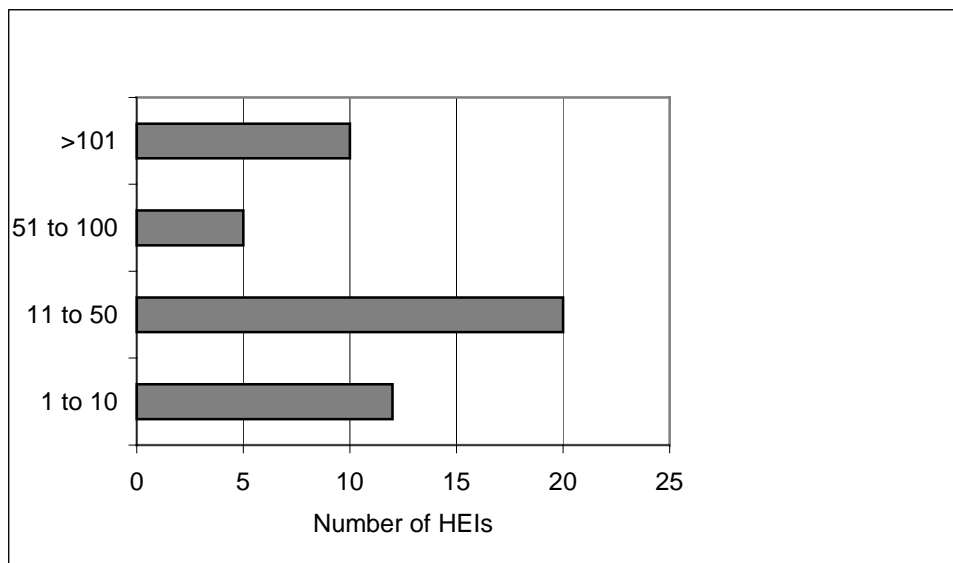
Analysis of the proportions of this income that originate from regional, national or foreign firms is not particularly fruitful due to the small numbers able to provide such detailed information. Of the 41 HEIs able to provide disaggregated figures, for a total of £11,834,157, 25% was from regional sources and only 12% from foreign sources. These proportions varied hugely among the HEIs, from those with almost 100% of such income from regional sources and others with very low proportions of regional income.

It is clear from this that some institutions provide these sorts of services for a primarily local service base, through a combination of specialist and general facilities, often with public support through programmes such as the European Structural Funds. Others operate specialist facilities at a national scale, usually through departmental initiatives. However the characteristics of HEIs selecting these routes are highly varied, with the focus depending often on individual departments or research groups. For many HEIs, the availability of external funding for acquiring equipment to support research will also require the provision of services to business, such as

through ERDF programmes. In these cases the primary orientation will be to the local region and SMEs.

Fewer HEIs (only 47) were able to provide information on the total number of firms making use of these services. Most of these report relatively small numbers of firms, typically under 30, with again a small group with much higher levels of involvement. A total of 4,825 firms were reported to have been assisted, although a large proportion of these (2,000 firms) worked with one large, research-based university.

Figure 4.8 HEIs providing equipment-related services classified by number of firms involved



Source: HEBI survey 2001