ETB Response to the Lambert Review

Improving the capacity of businesses to collaborate with universities

A partnership to promote science, engineering and technology

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Introduction

The Engineering and Technology Board (ETB) welcomes this opportunity to assist the Lambert Review of how long term links between business and British universities can be strengthened to the benefit of the UK economy.

Although there are many issues to do with the ability and willingness of UK universities to collaborate with business, the ETB has chosen to concentrate on one specific aspect of the Review, ie the capacity of businesses to relate to and utilise the skills of UK universities. Thus, the submission looks in detail at the degree of collaboration that exists currently within the UK and then goes on to examine the UK's position relative to the rest of the European Union. The role of the ETB and its relevant work programmes are also addressed.

During the preparation of this submission views were sought from a wide range of interested organisations, including approximately 1500 business and industry employers. In addition, discussions were held with Universities UK and members of the ETB's various advisory panels. Notwithstanding this extensive consultation, the views, opinions and recommendations expressed in this report are those of ETB[1].

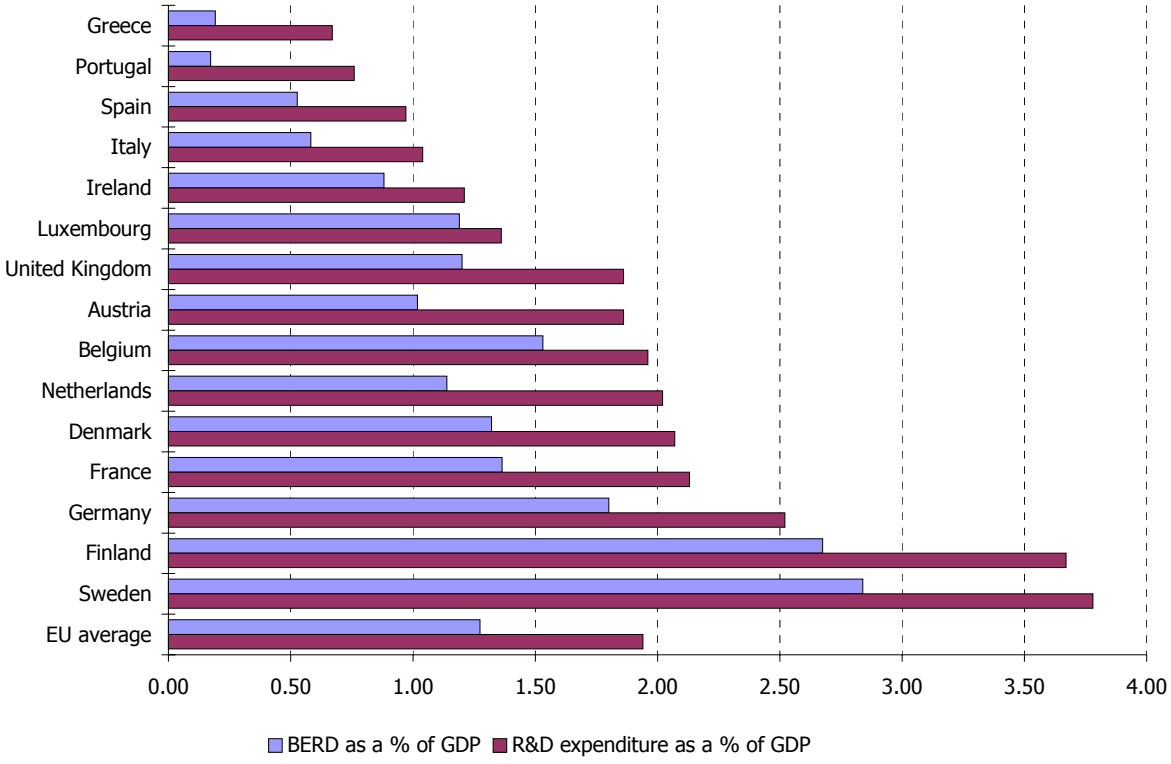
UK relative performance

Concern has existed for some time about the relative levels of investment in Research and Development (R&D) in the UK and in particular by UK businesses. As shown in Figure 1, overall UK spending on R&D as a percentage of GDP is 1.86 per cent, which is below the EU average of 1.94 per cent and, perhaps more importantly, below the spending of key competitor nations such as France and Germany. Looking at the UK business sector specifically, expenditure by British companies is also below the EU average (1.20 per cent of GDP compared to 1.27 per cent).

The UK's relative position in terms of business's co-operation with universities is less well known, but the available data paints a similar picture to that of R&D spending such as the European Commission's Innobarometer Survey, which interviewed 3,014 managers across Europe, at companies employing more than 20 people, stratified by country, size of company and sector.

[1] *This ETB document does not necessarily commit or represent the views of other such organisations.*

Figure 1: Business and total R&D expenditure as a percentage of GDP

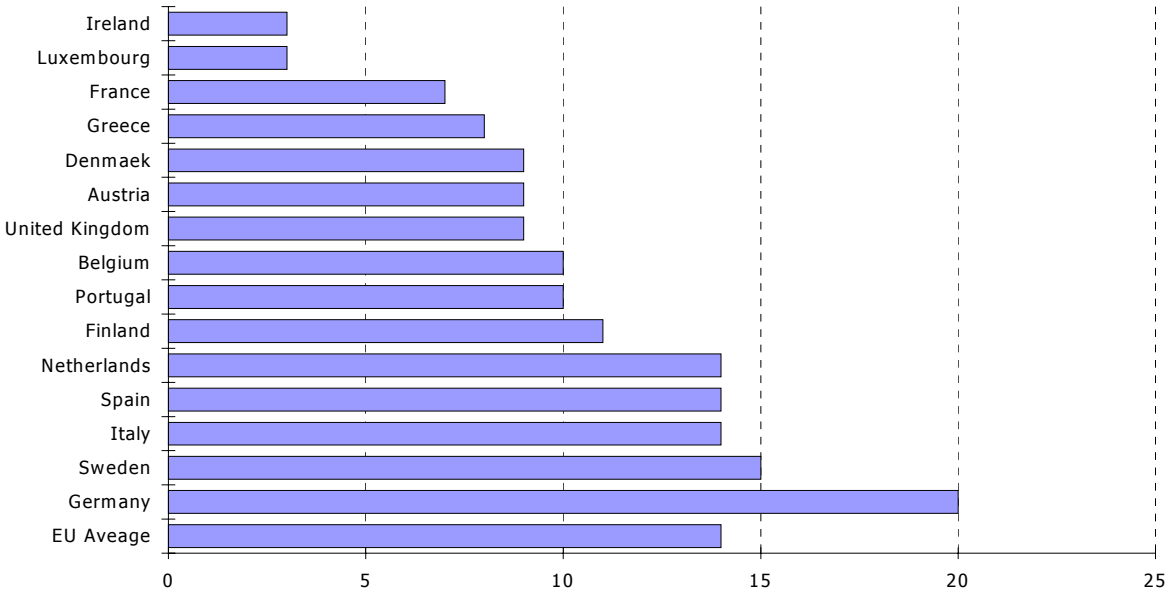


Source: Frank (2003) Eurostat

Innobarometer asked companies to identify their two most important ways of accessing advanced technologies. Figure 2 presents the percentage of respondents citing 'co-operating with universities or public research laboratories' as an important source of access to advanced technologies. Reflecting the situation with R&D spending, it shows that UK companies are below the EU average when it comes to co-operating with universities. Only nine per cent of UK companies cite co-operation with universities compared with an EU average of 14 per cent. Again, perhaps more importantly, the UK's levels are below those of important competitor countries.

Differing industrial structures within the EU Member States may be one explanation for these relatively low levels. The UK may have fewer companies and a smaller proportion of the economy in sectors that invest in R&D and co-operate with universities. But despite this, it should be recognised that economic growth and the development of a knowledge economy is more likely than not to be driven by R&D investment and university collaboration.

Figure 2: Percentage of companies citing co-operation with universities and public research organisations as one of two most important ways of accessing advanced technologies



Source: European Commission (2002), Innobarometer

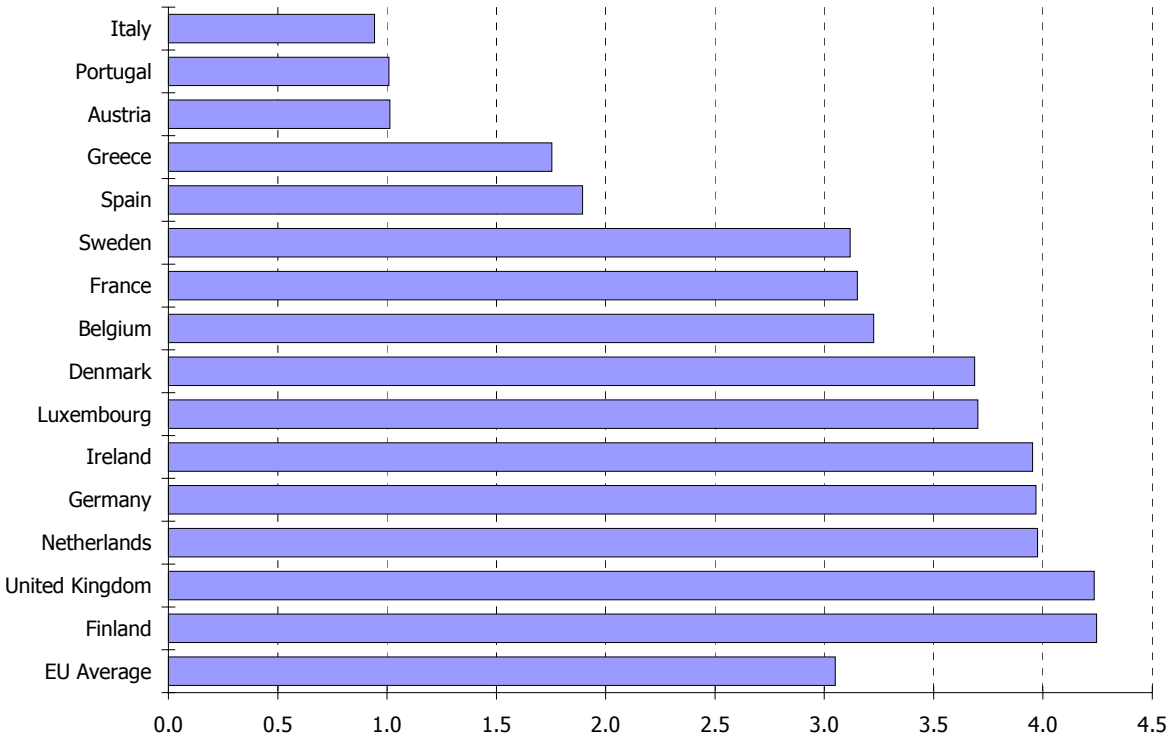
Another explanation often given for the UK's lower R&D investment is a shortage of Science, Engineering and Technology (SET) skills. However, as Figure 3 shows the UK has one of the highest proportions of its workforce employed in SET professional occupations[2].

This suggests that the problem of low R&D investment and collaboration with universities is more to do with the corporate cultures of UK companies. In part this may be due to an unwillingness to invest in the long term. However, there also appears to be a problem with how companies utilise their SET workforce and how they relate to universities.

The concept of 'absorptive capacity' of businesses was developed by Cohen and Levinthal (1990) and defined as 'the ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends'. It is argued that with High Technology firms this ability is dependent on investment in highly trained scientists and engineers as well as Research and Development (R&D) spending.

[2] Defined as International Standard Classification of Occupations (ISCO) Minor groups: 211 Physicists, chemists and related professionals; 212 Mathematicians, statisticians and related professionals; 213 Computing professionals, and; 214 Architects, engineers and related professionals.

Figure 3: Percentage of workforce professional scientists, engineers and technologists, 1999

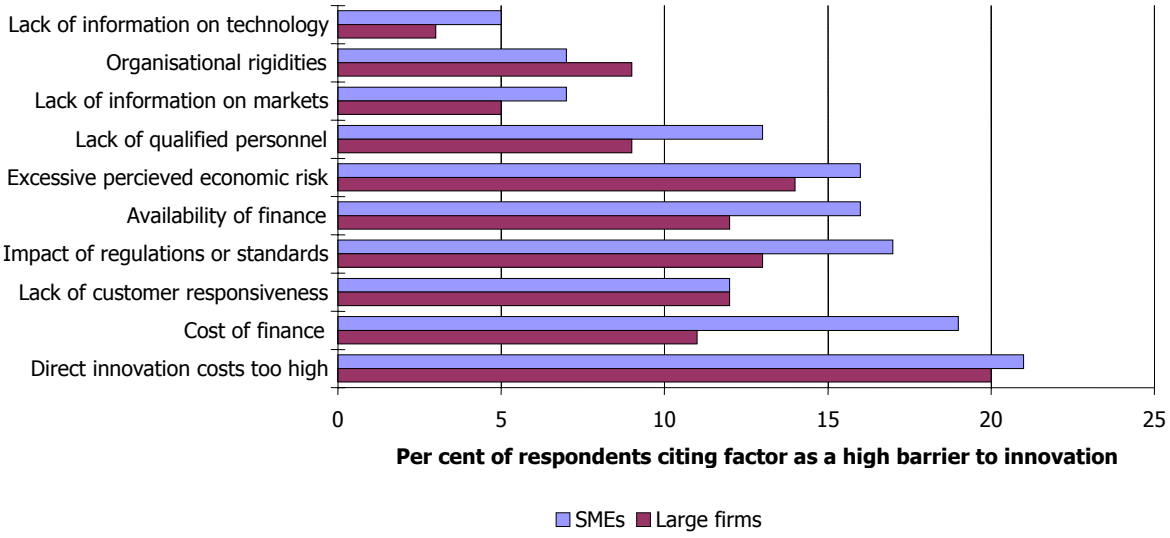


Note UK Data relates to 1998 and Ireland data relates to 1997
Source: Analysis of Eurostat LFS data by Institute for Employment Studies

Given the UK data it would seem that the absorptive capacity may explain some of the low levels of collaborations with universities. This position is supported by various published analyses of the UK data from the third Community Innovation Survey (CIS III). The CIS III survey is the third of a series of surveys examining innovation processes and business collaboration others bodies including universities. Unfortunately, so far very little comparative data from these three surveys has been published and in practice there is only UK data available.

The analysis of the UK data by Stockdale (2002) shows that 13 per cent of enterprises cite a lack of qualified personnel as a high barrier to innovation and, as Figure 4 shows, this problem is most acute for SMEs. Importantly, however, the data shows that problems related to financial factors are deemed to be more significant by businesses of all sizes (even though it is SMEs that have the greatest concerns when it comes to specifics such as the cost and availability of finance). The increasing availability and knowledge of R&D tax credits will help to address these financial barriers. An unintended consequence, however, will be an increase in the relative significance of concerns regarding the supply of qualified personnel.

Figure 4: Enterprises reporting various barriers to innovation to be highly important



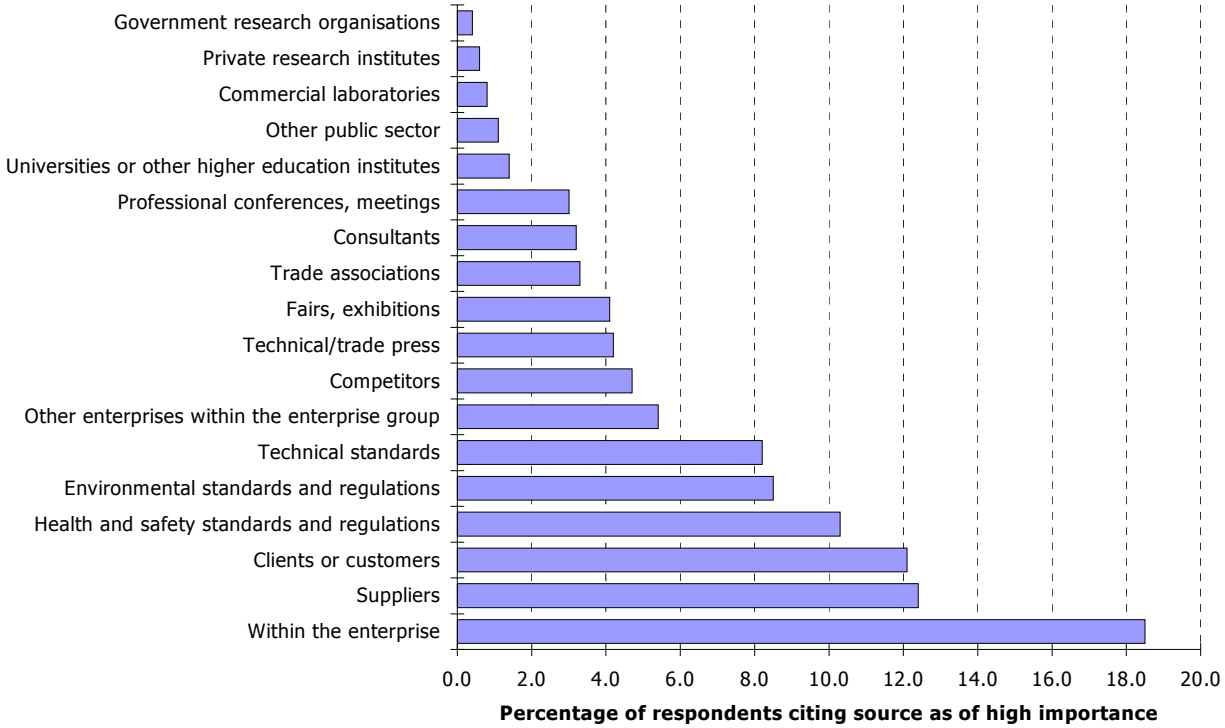
Source: Stockdale 2002

Citing as a barrier the lack of qualified people may be perplexing given the relatively high proportion of employees in SET occupations (fig. 3). The most likely explanation is that the skills of the SET employees may not be up-to-date or appropriate. Likewise, they may be being used for other functions than supporting innovation and university-business collaboration.

A further problem for co-operation and technology transfer between universities and enterprises is that universities are ranked very low as important sources of information.

Figure 5, also based on Stockdale, shows that only 1.4 per cent of enterprises rate universities as a highly important source of information. Sources within their enterprise (18.5 per cent) and their suppliers (12.4 per cent) are perceived to be far more important in this regard.

Figure 5: Importance of sources of information

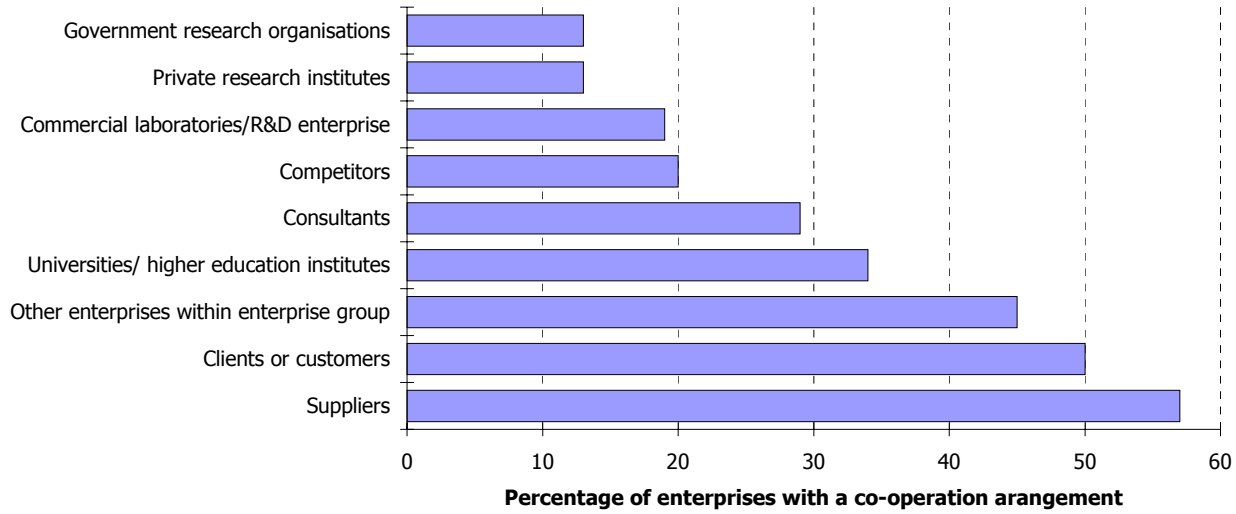


Source: Stockdale 2002

It is argued by Swann (2002) that in part information flows from universities are also indirect, rather than direct. As such information from universities can be mediated by other sources such as their suppliers. Even so, this suggests evidence that businesses and universities have a mutual problem communicating with each other.

The picture of university-business collaboration is less problematic when only those who have an innovation related co-operation agreement are examined (Figure 6).

Figure 6: Partners for innovation co-operation



Source: Stockdale 2002

For this group of enterprises just over a third has a co-operation agreement with a university or higher education institution. Although, even here suppliers (57 per cent) and customers or clients (50 per cent) are more important collaboration partners.

Swann (2002) also examines the relationship between the range of variables available from the CIS III survey. This shows that co-operation arrangements with universities are associated positively with the proportion of employees educated to degree level and above in science of engineering subjects as well as whether the enterprise is engaged in internal or external training that is directly related to innovation activities. Interestingly, Swann also shows that co-operation with universities is more likely to be undertaken by enterprises citing a lack of qualified personnel as an inhibitory factor for innovation.

This indicates that a lack of SET skills and a lack of relevant training or staff development is an important component of the lack of absorptive capacity amongst companies. Equally, companies which recognise that innovation efforts are hampered by a lack of qualified personnel are more likely to co-operate with universities. However, it is widely appreciated that there is a growing shortage of SET skills and that, therefore, measures are needed to encourage more young people to study these subjects and pursue SET careers (Roberts, 2002). Thus, any increase in enterprises' absorptive capacity needs to come from better mobilising the currently available SET skills. Equally, there is a need for appropriate training and development of the existing SET staff.

Other Recommendations and Observations –

Business Perspective:

Creating the environment to drive wealth creation requires regions to conduct analysis on the past and present positions using economic, market and societal variables that reflect the data points within their region. In developing the 'Business Case' for the 3rd leg mission, it is essential for higher education institutions (HEIs) to develop a clear understanding of their target markets, the expectation of employers and the infrastructure that universities need, to deliver their Business Propositions in innovation and knowledge and technology transfer. The development of such propositions should take cognisance of the need to connect the HEIs' propositions with regional development strategies thereby creating a cohesive and market driven approach that will stimulate regional economic growth. So, relevance and quality are the overarching requirements by business and industry.

- It is important to understand and apply the business vocabulary (e.g. Qualifications vs. Occupational Competencies). Therefore, the dichotomy that exists, between business and academic understanding needs to be reduced or even eliminated.

- It is important for HEIs to create better mechanisms that ensure their courses are continually updated, and are, of a consistent professional standard in line with employers' expectations and international professional benchmarks.

- Business characteristics and needs vary from region to region, sector to sector, company to company and even different departments within the same company. These disparate requirements need to be researched, analysed, prioritised and mapped to ascertain whether the RDAs and their institutions have the capability to meet these needs.

- Once the commercial value propositions are well defined, 3rd leg activities need to be considered with strong commercial emphasis by HEIs. Having the correct infrastructure and resources (Physical, Human Resources, Capital, Financial and ICT) to support the incremental development are, therefore, vital. For example, ensuring the availability of resources by augmenting staff timetables or creating joint ventures between educational providers, employers and regional economic development organisations are all good steps in the right direction.

- Social responsibility towards small and medium enterprises (SMEs) needs to be considered.). Unlike the large businesses whose voice often can be heard, SMEs and particularly their employees rely on local HEIs sympathetic support to fulfil their training and HR development needs, in a quality driven and cost effective way.

- Also worthy of consideration are the complementarities and roles between higher education and further education institutions in a regional context.

- The development of different types of joint venture activities between businesses and HEI ought to be encouraged, using the regional development agencies (RDAs) as brokers.

- It is recommended that for those HEIs that developed Business and Science Parks not to operate these parks just as real estate provision but to use these parks as extended enterprise to support their vision of enabling innovation and technology and knowledge transfer.

- It is highly desirable for the HEI sector to have a set of clear guidelines that are commonly applied to issues of Intellectual Property Rights (IPR) and Licensing.

- It is also highly desirable to ensure HEIs do not operate a client charging system based on marginal costing for their commercial activities, and thus, having to resort to applying cross-subsidy from other educational funds.

- RDAs are encouraged to develop with their HEIs, clear investment and legal support frameworks to underpin 3rd mission activities. Such frameworks should identify mechanisms on how to access pump prime funds, angel and venture capital investments.

- It is essential to **connect and align the interrelated roles of the various Government Agencies.** Every business executive, educational leader and public official understands the critical importance of a high quality workforce. Yet do we have the connectivity and sharing to align the skills priorities? For example, the LSCs are horizontally driven by subject matter whilst the Sector Skills Councils are driven vertically, by market sector. Connecting this disparity at a regional level to address regional and local skills gaps by educational providers has therefore been very difficult. In our view, having clear alignment and connectivity is the only way to ensure tangible improvement in regional economic development.

- Remedies could include the establishment of business partnership networks, enterprise clusters, competitive initiatives and favourable financial schemes for small businesses wanting to expand.

The ETB agenda

Part funded by the registration fees of professional engineers, by business and industry and also by Government, the ETB's strategic objective is to ensure the supply of Science, Engineering and Technology skills better matches, and stimulates, market needs. Therefore, a critical aspect of the ETB's mission is to promote initiatives that enhance education and professional development.

ETB works closely with the UK's engineering institutions via EC(UK). These institutions, many of which were established in the 18th and 19th centuries to provide engineering education and training before engineering was on the universities' curriculum, also recognise the importance of education and professional development. This has led to three important stands of activity for the ETB which address the problems of UK businesses absorptive capacity and hopefully in turn their capacity to engage productively with the universities:

- raising the profile of SET
- developing professional qualifications for SET employees, and
- developing Continuing Professional Development schemes for SET employees

Raising the profile of SET

The ETB is bringing together a wide-range of organisations from the sector to enhance public perceptions of SET. The ETB also supports the Science and Engineering Ambassadors (SEA) scheme. This scheme supports and trains scientists and engineers to go into schools to promote science and engineering.

Supporting the development of professional qualifications

Engineering Council (UK) is the body with sole responsibility for the regulation and registration of the profession. ETB is supporting their review and development of new professional qualifications that meet with the contemporary requirements of education, business and industry for the SET community. Part of this review also involves a detailed look at the role, status and training of technicians. Another aspect is the development and market testing of a new Chartered Technologist qualification.

Development of CPD

Linked to the proposed new professional qualifications which have a renewed emphasis on Continuing Professional Development the ETB is examining CPD and how this relates to competency and occupational frameworks.

Engaging Business & Industry

The ETB is working to ensure that the business and industry community is fully engaged with its agenda. Working in partnership with a number of organisations, the ETB is building business and industry networks. Its membership programmes are designed to (i) engage Business & Industry in the skills agenda, (ii) act as a source for research and (iii) build a more coherent and credible voice on behalf of the sector. The ETB also has sponsorship programmes which seek to secure the support of business and industry for ETB's work to promote Science, Engineering & Technology to 7-16 year old pupils and their primary influencers.

References:

Cohen W, Levinthal D (1990), Absorbative Capacity: A New perspective on learning and innovation, *Administrative Science Quarterly*, Vol. 35, pp. 128-152

European Commission (2002), *Innobarometer 2002: Innovation Papers No. 33*, Innovation Directorate European Commission

ETB (2003), *ETB Annual Review 2002/03,* Engineering Technology Board

Frank S (2003), *R&D Expenditure and Personnel in Europe 1999-2001. Statistics in Focus Theme 9 3/2003*, Eurostat

Medhat S S (1999) Innovation for wealth Creation – Building Regional Partnerships for Economic Strength ISBN 1-903032-01-6 WSM

Roberts G (2002), *SET for Success: The supply of people with science, technology, engineering and mathematics skills, the 'Roberts' Review'*, HM Treasury, DTI and DfES

Stockdale B (2002), *UK Innovation Survey 2001*, Department of Trade and Industry

Swann P (2002), Innovative Businesses and the Science and Technology Base: An analysis using CIS3 data, Department of Trade and Industry.