

Enterprise and Learning Committee

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Inquiry into the Economic Contribution of Higher Education in Wales

Written Evidence by Swansea University

0 Introduction

Swansea University endorses the broad review of the economic impact of higher education submitted by Higher Education Wales (HEW).

The University has chosen to take the opportunity in its own submission to present a forward-looking perspective on universities as drivers of the knowledge economy. This is taken to be a high value-added economy with disproportionately large numbers of highly skilled workers, with a talent for innovation and the management, leadership, R&D infrastructure and financing support to ensure effective wealth creation. The submission emphasises high-technology as the backbone of the knowledge economy and does not consider other important areas (eg cultural industries).

The first section of this report argues that higher education should be making a larger, more strategic contribution to the economy of Wales but that there are a number of obstacles to progress. The second section of the report summarises how Swansea University is attempting to address this modern agenda through building upon its strengths and working proactively with various stakeholders.

1 Creating a Knowledge Economy

Universities are usually the key driver.

"Universities and specialized research centres are the driving force behind innovation in nearly every region" (Clusters of Innovation National Report, USA Council on Competitiveness, Washington DC, 2001)

2 The Role of Universities

Increasingly, as a matter of routine, research-led Universities do all of the following (with the total 2005/6 income for Welsh HEIs in parenthesis):

Provide skilled graduates (circa £500m);

Undertake collaborative research with industry (£90m);

Support existing companies and businesses (£13m);

Spin-out new companies to exploit university IP (£1.5m).

We refer to these as **piecemeal** engagements in knowledge transfer.

More importantly, universities can engage **strategically** in knowledge transfer,

attracting and anchoring companies to create high-tech clusters; and

creating thousands of jobs in science parks.

This is not currently happening in Wales and the knowledge economy challenge for universities may be characterised as moving from the piecemeal to the strategic. There are, however, some serious barriers to be overcome if this is to be achieved successfully.

3 Barriers to Success: Research Quality

There is a high correlation between research quality and wealth-creating potential:

"Unsurprisingly, R&D-based and venture-backed companies locate around high-quality research universities to a far greater extent than around lower-quality research universities." (The Race to the Top, A Review of Government's Science and Innovation Policies, Lord Sainsbury, October 2007).

"European growth has been disappointing for the last 30 years but policymakers have only recently started to realise that Europe's growth performance is intimately linked with the research performance of its universities" (Why reform Europe's universities? Bruegel policy brief 2007/04)

Unfortunately, Wales has a comparatively weak university research base in Science and Engineering. The following figures show the number of academic staff in world-class (5/5*) Science and Engineering Departments in the 2001 Research Assessment Exercise, standardised per million population:

England	228
Scotland	354
Wales	101

The evident disparity with England is not an Oxbridge/London effect. England had more than twice as many scientists and engineers working in world-class departments as Wales while Scotland had three and a half times as many, even after allowing for population size.

This weakness of the higher education system in Wales also impacts on our capacity to produce high-quality graduates in science and engineering. The following table shows the percentages of students in each Country studying in research-led (4/5/5*) departments:

	Engineering	Science
England	3.2%	12.0%
Scotland	4.2%	12.9%
Wales	1.9%	10.7%

The figures for Wales are significantly lower than England and Scotland, dramatically so for engineering

4 Barriers to Success: Size of Institutions

Size is important (**bold**: our emphasis):

"**Without a large research base**, even highly engaged universities are not able to exert enough impact to make a difference in a regional economy" "(Universities and the Development of Industry Clusters, 2004. Report prepared for Economic Development Administration, US Department of Commerce by the Carnegie Mellon Center for Economic Development). "

". . . high-technology clusters are forming around **large** research universities "[in England]" . . ." "(The Race to the Top, A Review of Government's Science and Innovation Policies, Lord Sainsbury, October 2007). "

How large is large? Research in the USA suggests about \$100m (circa £50m) per annum spend on research. The smallest UK universities with substantial science parks are, to the best of our knowledge, Dundee (£57m research income in 2004/5), York (£54m), and Surrey (£43m). The latest figures for Wales show that only Cardiff was large enough in 2005/6:

University	2005/6 Total Research Income
Cardiff	£113m
Swansea	£26m
Bangor	£22m
Aberystwyth	£13m
Glamorgan	£5m
Others	<£2m

5 Barriers to Success: Subject Mix

The two most important academic research areas for wealth creation are medicine and engineering. Until recently, there had been only one medical school in Wales, at Cardiff, and Wales only attracted 1.6% of medical research funding in the UK in 2004/5. There are only two substantial research-led engineering schools in Wales, at Cardiff and Swansea. Core funding for research in medicine and engineering in Wales has actually reduced over recent years in real terms, by 7% and 11%, respectively, between 2001/2 and 2005/6.

6 Overcoming the Barriers

Universities tend to develop and evolve rather slowly. Given the current tight higher education funding environment in Wales, the above barriers are particularly challenging. The variety of different, disjoint, and (arguably) over-managed funding pots to support knowledge transfer in Wales also inhibits a strategic approach. The risks are that institutions lack the flexibility to align knowledge transfer activities with their strengths and that good staff are lost because of uncertainties over funding and limited career structures. On the other hand, there are a number of opportunities to build upon, including:

Recent large investments by the HEFCW reconfiguration and collaboration fund, some of which support wealth-creating infrastructure and activities (eg Institute of Cognitive Neuroscience);

Recent large ERDF/WAG investments in research infrastructure (eg Institute of Advanced Telecommunications at Swansea);

A second full Medical School for Wales, at Swansea;

Convergence Funding for universities in the Convergence area;

A Science Strategy for Wales;

Increasing private sector interest in R&D and Open Innovation collaboration with research-led universities;

EU support under the Lisbon and Bologna agendas;

Growth in collaborative research activity globally.

7 Swansea Strategy

Swansea University is in the fourth year of an aggressively ambitious strategy to "strengthen research, ensure a life and career-enhancing experience for students, and become a powerhouse for growth in the regional economy, as part of an accelerated 'virtuous circle' of improvement". Explicit in this strategy is, therefore, a commitment to move from a piecemeal to a proactive, large-scale, and strategic approach to developing a modern knowledge economy in Wales.

Academically, the strategy focuses on:

Incremental growth, investing against business plans and diverting resources to the most successful areas; and

Strategic ('Quantum Leap') initiatives, attracting external funding for large new academic developments with the critical mass and level of funding to have a significant impact on the University's profile.

The largest Quantum Leap project to date is the circa £50m Institute of Life Science with substantial funding from WAG, ERDF, and Industry (primarily IBM).

The forecast effect of this strategy on total research expenditure (core HEFCW funding and research projects) is shown in Figure 1. The total expenditure per annum should reach the important £50m level by 2009/10.

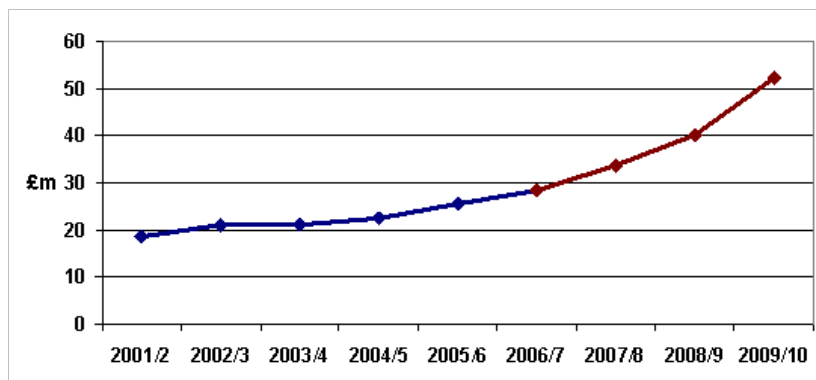


Figure 1: Swansea University Research Expenditure

8 Driving the Knowledge Economy

Swansea's engagement with the knowledge transfer agenda is evidenced by the University's key role in developing the Technium project and supporting its roll-out across South West Wales. There are currently two Technium facilities on campus, Technium Digital which is aligned to the ICT sector and a 'micro' Technium within the Institute of Life Science. Alliance Boots recently established their Centre for Innovation at the Institute of Life Science Technium, supported by Venture Capitalists Longbow Capital.

Swansea has an extensive track record of working with industry on collaborative research and high-level skills development. The latest figures (Higher Education Business and Community Interaction Survey, 2005/6) show Swansea third in the UK for attracting research funding for work with industry, including funding in kind:

Cambridge	£59m
Oxford	£53m
Swansea	£47m
Imperial College	£43m

Swansea's flagship higher-level skills courses are EngD schemes with Corus and with Rolls Royce (via Birmingham University) and the AMBA-accredited MBA schemes, both full-time and part-time. These are complemented by a number of skills focussed postgraduate courses, including:

Distance learning MSc in Printing and Coating delivered primarily to staff in SMEs;

Large portfolio of Masters courses in specialised fields of engineering, computing, and telecommunications;

New Masters courses providing skills essential in addressing modern environmental agendas (eg Recycling Technology); and

Full-time MBL for the entrepreneurs wishing to set up their own companies.

Postgraduate students play a vital role in developing and sustaining productive industry/university links. These links also add value to the student experience and provide industry with recruitment pathways. It is important to note that the Engineering post-graduate courses have a fragile funding base, depending heavily upon a five year £6m EPSRC Collaborative Training Account won by Swansea against fierce competition.

9 Swansea University Innovation Campus

This is a new concept at an advanced stage of discussion. The intention is to provide an intensive, open-innovation environment by inter-mingling industrial R&D, academic research, and postgraduate students. The campus will also be designed to facilitate the growth of high-technology clusters in the region by including consultancy, access to business support, and incubator (Technium) facilities. It has the potential to become an international exemplar of how to support industry/university interaction.

The academic mix will include Engineering, Computing, and Telecommunications, together with the Business and Law Schools. The industrial mix will include R&D groups and research/test facilities for large companies together with smaller high technology companies attracted to Swansea by this opportunity. Discussions with appropriate companies are underway and promising. The second campus will also relieve pressure on the University's Singleton campus, enabling complementary developments in life science, nano-health, and medical research, in particular.

Discussions are underway about a coordinated and linked development at Bangor University with the two universities pooling their expertise and sharing industrial contacts.