

Yorkshire Forward and Economic Development

Learning Legacy Module 10:

Innovation



The Region's
Development Agency

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Executive Summary

In today's global economy the ability to innovate is increasingly seen as the key to economic success. Research consistently indicates that the *successful exploitation of new ideas* is central to raising productivity, competitiveness and growth in the economy. And it is this that we must embrace if we are to retain our place among the world's leading economies.

Evidence suggests that the Yorkshire and Humber region underperforms against a number of key indicators of innovation. In particular, R&D expenditure amongst the regions businesses represents just 0.5% of GVA, the lowest of any region with the exception of London, painting a picture of both real need and of real opportunity.

From the outset Yorkshire Forward recognised the important role that innovation can play in supporting economic growth. Successive Regional Economic Strategies have sought to tackle the barriers faced by business, emphasising the role of innovation in increasing the regions business competitiveness and seeking to stimulate activity in this area.

For the last decade activity has fallen broadly within three typologies: Research and Development Grants; Knowledge Transfer and Collaborative Research; and Business Support and Information.

A number of major projects and programmes have been run including Grants for Research & Development, Centres of Industrial Collaboration, and the Manufacturing Advisory Service. Taken collectively with other projects and programmes they have helped to shape the profile of innovation activity within the region. They have helped businesses to develop and bring to market new products, modernised business processes, strengthened links between business and the HEI base, and supported increased commercialisation of university research.

Furthermore, an evaluation of Yorkshire Forward's investment in innovation indicates that they have had a significant economic benefit. Between 2007 and 2010 Yorkshire Forward invested in the region of £40m in a broad range of activity to support Innovation. The report estimates that this generated an increase in GVA of up to £330m representing a return of investment of somewhere in the region of £8.3 per £1 invested.

There is no doubt this represents a significant achievement. However, it is worth noting that overall – beyond the direct impact of the projects and programmes - there seems to have been much less of an impact on 'innovation culture' amongst the regions businesses, with benefits often restricted to programme participants. This lack of penetration in the wider business base is a cause for concern. It is perhaps reflected within the region still languishing near the bottom of the league tables for business investment in R&D (although R&D investment is a limited indicator that is heavily influenced by economic structure - there is increasing recognition that the metrics being used to measure and value innovation are inadequate and much innovative activity is taking place that is not being captured by R&D spending).

Overall then, there is much that is positive from the last decade but there is still room for improvement. If the region is to achieve a step change in innovation culture, alternative interventions might be required - moving beyond those already undertaken to include activities that tackle broader cultural and socio economic issues such as a lack of appropriate skills or issues to do with mindset, management and organisational dynamics.

Key lessons and insights include:

- a) **Establish a clear baseline:** It is important to be able to measure the success of interventions yet current indicators are generally considered to be inadequate. Careful consideration should be given to this at the outset.
- b) **Establish a clear rationale and strategy:** A clear rationale that properly considers and targets the underlying issues is crucial. It may be necessary to address some of the prevailing socio economic factors first (e.g. lack of appropriate skills or a creative culture) or at least alongside innovation promotion. Alternative interventions might be required to address the underlying issues.
- c) **Consider longer term impacts:** The commercialisation of R&D and the realisation of any associated benefits can take many years. Introducing a monitoring and evaluation framework that measures the impact over a more prolonged period might be beneficial. Expectations should be for long term benefits, not quick wins.
- d) **Avoid working in silo's and too narrow a focus:** Innovation is not just about universities or business R&D. Driving up innovation activity is as much about delivering a cultural change in both business and individual attitudes, and has strong links with the enterprise and skills agendas.
- e) **Listen to Business (and Universities):** In order to be successful you must go beyond establishing economic policy and embrace a practical, industrial approach which is both understood and valued by business.
- f) **Play to your strengths:** The lack of improvement at a regional level might, at least in part, reflect a lack of business stock in R&D intensive sectors. The same issue will apply to other geographies too. Activity needs to work alongside efforts to grow business and employment across key sectors.
- g) **Integrate to innovate:** The ability to join up innovation work with other economic activity – for instance on sectors, investment, skills and the low carbon agenda – has aided success. Equally, the potential for innovation is often greatest at the crossover between sectors.
- h) **Don't lose sight of progress made to date:** The region has excellent Higher Education facilities, and the culture shift is now starting to take place on a larger scale, as a result of earlier policy that has proactively harnessed HE and business collaboration. It is important to build on this and not lose it.

1. Task/Purpose

The rationale for Yorkshire Forward's approach

In today's global economy the ability to innovate is increasingly seen as the key to economic success. Research consistently indicates that the *successful exploitation of new ideas* is central to raising productivity, competitiveness and growth in the economy. And it is this that we must embrace if we are to retain our place among the world's leading economies.

The latest evidence indicates that the major emerging market economies (Brazil, Russia, India and China) are no longer simply low value added producers but are adding their weight to the creation and commercialisation of innovative products, processes and services.¹ This has led many including the OECD to conclude that *'the capability to innovate and to bring innovation successfully to market will be a crucial determinant of the global competitiveness of nations over the coming decade'*².

It is therefore increasingly important to pay particular attention to technological change where this is reshaping industries and to we provide businesses with an environment that supports and encourages the innovation process³; allows them to successfully bring new products and processes to market; and crucially remain globally competitive into the future.

At present the UK lags many parts of the world on measures of innovation. It is clear that much needs to be done at a national level. However, it is when we look at the regional data that we begin to see significant disparities. Underperformance is magnified at a regional level where data indicates that with the exception of London, Yorkshire and Humber businesses spend less on R&D activity as a proportion of overall GVA than those of any other region. That position that has been consistent since 1998⁴

Business R&D as a % of GVA by Region, 1998 – 2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
England	1.5	1.5	1.5	1.5	1.4	1.4	1.3	1.4	1.4	1.5
Yorkshire & Humber	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5
North East	0.7	0.6	0.6	0.4	0.4	0.4	0.7	0.8	0.8	0.8
North West	1.5	1.8	1.7	1.8	1.7	1.6	1.7	1.8	1.4	1.8
East Midlands	1.6	1.6	1.7	1.6	1.6	1.4	1.4	1.4	1.3	1.4
West Midlands	1.1	1.1	0.8	1.1	1.0	1.0	0.9	0.9	1.1	1.1
East	3.6	3.7	3.8	3.7	3.3	3.4	2.9	3.9	3.9	4.1
London	0.4	0.5	0.5	0.4	0.5	0.3	0.4	0.2	0.4	0.4
South East	2.3	2.5	2.4	2.5	2.3	2.2	2.0	2.0	2.0	2.0
South West	1.5	1.4	1.3	1.5	1.6	1.6	1.6	1.4	1.4	1.3

Source: Progress in the region 2010 from: BIS, Regional Economic Performance Indicators, 2009

¹ OECD (2007), Innovation and Growth: Rationale for and Innovation Strategy

² *ibid*

³ see HMT (2004) Productivity in the UK 5: Benchmarking UK productivity performance

⁴ Yorkshire Futures (2010) Progress in the Region 2009

The number of patents granted is also often taken as a proxy for the levels of innovation within an economy. As might be expected from the previous R&D figures, the region does not on face value fare well on this measure either, although the picture is more complex and mixed. In 2008, 132 patents were granted in Yorkshire and Humber, placing it seventh of the nine English regions. This position has been consistent since 2004 but is a slight improvement on its eighth place in 2003⁵. The number of patents granted has fallen significantly nationally over this period. If not due to methodological change in granting or measuring patents, that trend is problematic. However, it is noticeable that the decline in patents in Yorkshire and Humber since 2003 (23%) is significantly lower than in any other region and the England average (43%), suggesting that the gap is beginning to close.

Patents Granted by Region, 2003-2008						
	2003	2004	2005	2006	2007	2008
England	3,227	3,374	3,303	2,694	1,805	1,855
Yorkshire and Humber	172	216	200	150	125	132
North East	54	51	64	82	33	32
North West	326	274	312	254	187	167
East Midlands	180	194	174	128	96	109
West Midlands	360	332	287	234	149	159
East	420	492	484	371	264	272
London	561	645	570	524	316	361
South East	799	820	822	607	428	411
South West	355	350	390	344	207	212

Source: Progress in the region 2010 from: The patent Office, Intellectual Property Office Facts and Figures, 2008

Evidence collated for the 2006-15 RES suggests that innovation amongst the region's larger business is relatively good with activity taking place in 70% of businesses, yet when looking at the region's SMEs the figure is only 42%, somewhat short of the national average of 46%.

It is clear that if we are to contribute our weight to national performance and more importantly compete as a region we must up our game, and in particular increase the number of SMEs involved in innovation. Levels of Business R&D have remained static and are significantly lower than those in generally comparable regions such as the North West, North East and West Midlands. They are inevitably also much lower than in the highest performing region, the East of England where performance has much to do with the presence of Cambridge University and the science based R&D facilities clustered around it.

Nevertheless, analysis in the round on innovation paints a picture of both real need and of real opportunity. It is estimated that by increasing R&D activity up to the England average of 1.5%, an additional £820 million could be added to the region's economy. Based on 2010 GVA figures this would equate to around an additional 1% to the region's economy⁶.

⁵ Yorkshire Futures (2010), Progress in the region 2009

⁶ Yorkshire Forward (2010), Regional Strategy Innovation Evidence Report

And, whilst many of the statistics point to underinvestment in R&D by businesses, the opposite can be said of the regions universities. These rank among the top research universities in the Country and compare favourably in terms of R&D expenditure.

Higher Education R&D as a % of GVA by Region, 1998 – 2007

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
England	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5
Yorkshire & Humber	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6
North East	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.6
North West	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5
East Midlands	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
West Midlands	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
East	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5
London	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6
South East	0.4	0.4	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.5
South West	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Source: BIS, Regional Economic Performance Indicators, 2009

This supports what many already know. Universities are a huge asset to the region, with excellence in key areas of applied research and science essential to grow the economy. It is important to we continue to utilise their knowledge base and transfer it to business. Indeed it is partly by encouraging collaboration and knowledge transfer between the commercial and academic sectors that we can help them to resolve challenges, create new products and services, and become more competitive and more profitable.

Barriers and Market Failure

Of course, it is important that any approach taken represents value for money, and provides the right levels of incentive while avoiding any distortion of existing activity. Before acting it is therefore critical that the underlying cause(s) of the tendency to under invest in innovation activity is fully understood. Accurately identifying these market failures enables better targeting of investment and provides solutions that are far more likely to be effective.

Studies undertaken over the last decade point to a number of distinct - but often interlinked – barriers, preventing businesses from engaging fully in research and development activities, leading to a lower level of innovation than would be otherwise desirable. Taken together the presence of these barriers can provide a clear justification for public sector intervention. Key market failures in this instance include externalities, and imperfect information.

Externalities

Externalities or 'spillovers' as they are sometimes known can occur when the actions of an individual or company impact on others, but these effects and associated costs and benefits are not taken into account in the individual's or company's decision-making.

For example when a firm undertakes R&D they may fail to appropriate all the returns from their investments in innovation, with benefits spilling over to customers, suppliers, competitors and many others⁷. Work undertaken by GHK consulting on behalf of Yorkshire Forward points out that *"since firms make their decisions based only on the private rate of return, they will fail to undertake some projects that are socially desirable, and they will generally pursue the projects that they do undertake at a level of resource commitment that is lower than is desirable from the point of view of society as a whole. In economists' jargon, there is a "market failure" with respect to R&D that results in market forces allocating fewer of society's overall resources to R&D than is desirable"*⁸.

In general it is thought that spillovers in sectors where the Yorkshire and Humber economy has more industrial activity will be more valuable to the region than those sectors where there are fewer firms able to enjoy the benefits of the innovation⁹.

Imperfect Information

All investments can be characterised by a degree of uncertainty and risk. This is perhaps particularly true in regard to investment in research and development or innovation. Work undertaken by BERR into the drivers of government funded business support suggests that information is often not held widely or where it is, that there can be a high degree of uncertainty due to the imbalance between the information held by the buyer and that held by the seller. The report concludes that *"This can significantly reduce the willingness of investors to support a project and can prevent companies from investing in technical expertise - where the buyer cannot distinguish between good and bad quality suppliers - or in partnerships with external parties they know little about. While firms should in principle be willing to pay for such information, they may well ignore that such information even exists, let alone know whether this is information worth paying for"*¹⁰. It is this assessment of risk that often prevents businesses from investing in what might otherwise be considered to be beneficial activity.

⁷ BERR (2008) The economic drivers of Government funded business support

⁸ GHK (2008) Evaluation of Yorkshire Forward Centres of Industrial Collaboration Programme Final Report

⁹ Innovas (2009) Innovation Vouchers Scheme – Evaluation Scoping Phase Report

¹⁰ BERR (2008) The economic drivers of Government funded business support

2. Approaches Adopted

From the outset Yorkshire Forward recognised that innovation can play an important role in supporting economic growth. However it was clear that the region's performance in this area was some way behind that of other regions. Successive Regional Economic Strategies sought to tackle the barriers described above and address this gap, emphasising the role of innovation in increasing the region's business competitiveness and seeking to stimulate activity in this area.

It is possible to characterise activity as falling into three key typologies, each seeking to overcome specific barriers.

a) Research and Development Grants: R&D Grants are aimed at helping entrepreneurs and business owners fund the R&D required to get their innovative products and processes to market. Innovation isn't easy. It's risky, often expensive and difficult to fund through private sector investment. By providing financial help towards the costs of R&D, these grants enable businesses to carry out projects that they would not necessarily be able to undertake on their own. R&D grants reduce risk and uncertainty and provide incentives for companies to engage in activity they may otherwise choose not to. Activities in this area have included Grants for R&D, and Grants for Industrial R&D.

b) Knowledge Transfer and Collaborative Research: 'Knowledge transfer' is what happens when businesses collaborate with the knowledge base (universities, further education colleges, and research & technology organisations). By working together on specific projects, the commercial and academic sectors can help each other to resolve challenges, create new products and services, and become more competitive and more profitable. By facilitating the coming together of research institutions and businesses knowledge transfer networks and collaborative research initiatives remove risk and encourage businesses to undertake activity they may otherwise not pursue. Activities have included, Centres of Industrial Collaboration, Knowledge RICH, and Innovation Vouchers.

c) Business Support and Information: This provides direct access to the information, specialist support, and resources that businesses need to adapt in today's market, improve efficiency, raise productivity, and develop new ideas. It helps to reduce risk and encourage investment. Activities have included the Manufacturing Advisory Service.

The next section of the paper considers these three areas as they were implemented across the different time periods of the Regional Economic Strategy, drawing on key case studies, before returning to them to draw out any useful lessons and insights.

The 2000-2010 Regional Economic Strategy

The first RES (2000 – 2010) sought to set innovation in the context of the wider business support environment. It established a series of priority actions amongst which was to *“increase the competitiveness and innovation of businesses in key economic sectors by providing them with first class business support”*¹¹. It additionally made 'creativity, innovation and technology' one of five cross cutting themes. During this time key initiatives such as Grants for R&D and the Manufacturing Advisory Service were established.

¹¹ The Regional Economic Strategy for Yorkshire and Humber 2000-2010

CASE STUDY: Grants for Research and Development:

Grants for Research and development (GRD) was a nationally available business support product which awarded grants to small and medium-sized businesses (SMEs) for research and technology development purposes.

Any individual or a partnership planning to start up business or an existing small to medium-sized business with fewer than 250 employees could apply though the project was required to be based around an innovative product or process that they were seeking to bring to market. Between 1999/00 and 2007/08, some £31.8 million had been invested by Yorkshire Forward in the GRD/Smart programme through 581 grant awards to 502 businesses.



Performance

In 2010 Ekosgen undertook an evaluation of the GRD award scheme, and its predecessor Smart, in the Yorkshire and the Humber region – covering activity from 1st April 1999 onwards. It found that in terms of net impact the region performs comparably with the national average, with the returns on investment at 1:7.35 only slightly lower than those seen nationally at 1:9.

However it also noted that *‘there are lower levels of improved technical skills, quality processes and a notably weaker improvement in R&D attitude and culture. Downstream benefits, lower levels of subsequent R&D investment, activity and innovation, are also reported by fewer of the region’s businesses than nationally. There are fewer hardedge IP related effects and a weaker culture of collaboration with HEIs and research organisations’*. Going on to conclude that *‘to some extent, these weaker effects will be a function of Y&H as a more traditional economy compared to London and the South East, although the findings illustrate the distance the region still needs to travel in engendering an R&D culture in businesses’*¹².

Lessons

On a much more positive note the evaluation reported that ‘businesses have a positive view of GRD and it is seen as highly useful business support and a means to further develop both a product and the business. It has allowed businesses to successfully bring a product to market, explore the feasibility of an idea and progress the business to the next stage. The impacts of the grant in terms of business turnover and employment have been positive for most companies.

Furthermore, in many cases GRD acts as a catalyst for supported businesses, who often go on to access other forms of support, either through GRD or other channels. There is also evidence from successful businesses that GRD acts as a catalyst to bring in other forms of investment to the business, such as increasing investor confidence.

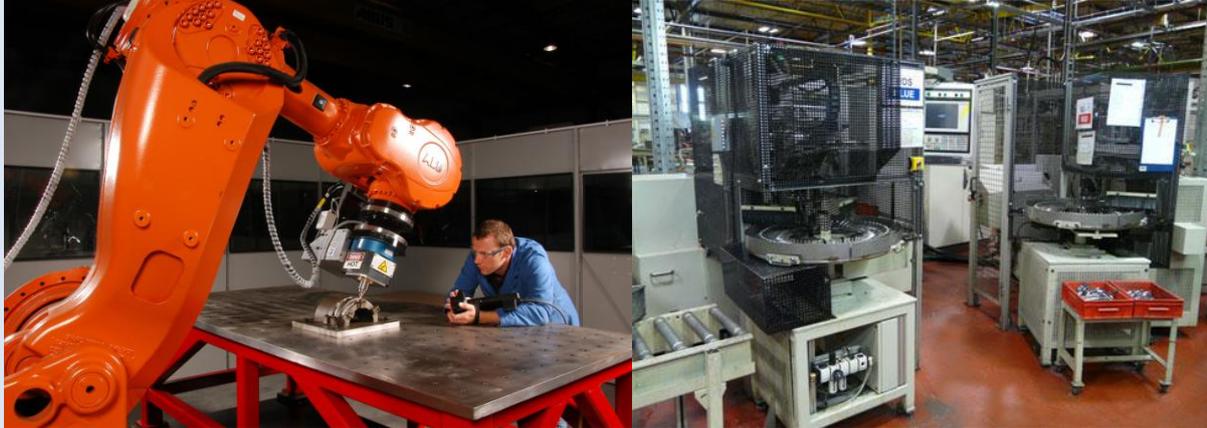
The profile of businesses applying for and awarded GRD/Smart differs from that nationally. More support is sought for conventional product/process improvements and business growth in the region than nationally, and less support is sought for commercial feasibility projects or for those that involve external and partner collaboration. The intermediate effects reflect this: far fewer businesses report improvements in R&D culture, attitudes, IP and subsequent investment than nationally.

The relevance and value of GRD varies across the sectors. The grant is a useful mechanism in sectors/sub-sectors where there is clear product/process development, such as Advanced Engineering, but less well used/perceived where there are long lead-in times, such as pharmaceuticals, or where there is the need for quick turnaround, such as Food and Drink, or where the innovation is typically new to the company rather than genuinely new, such as software.

¹² Ekosgen (2010) Evaluation of the Grants for Research and Development (Final)

CASE STUDY: Manufacturing Advice Service

The Manufacturing Advice Service (MAS) was established and launched by the DTI in partnership with the RDAs in 2002. Operating through a series of regional centres it offered firms direct access to a network of experienced manufacturing specialists, world class associates and subsidised consultancy assistance to enable them to adopt new processes and technologies; improve efficiency; raise productivity; develop new ideas; and ultimately, help to improve their competitiveness.



Performance

MAS is generally considered to have performed well. An evaluation of its first three years undertaken by DTZ Consulting indicated that 'MAS appeared to have widened and opened up access to information and shared knowledge in relation to key issues pertinent to manufacturing operations and businesses'¹³. Whilst an evaluation of the second phase of MAS found that between April 2005 and October 2007, the regional MAS programme had responded to nearly 21,000 enquires, far exceeding the target that was initially set (6,000). In doing so the evaluation estimates that it was able to make a significant contribution to sales, profits and jobs that would not have occurred without the support offered through the programme¹⁴.

The Net Impact of MAS (phase2)		
Gross Outputs		Net Impact
Sales	£78.4m	£40.6m
Profit	£26.6m	£13.8m
Jobs	5,941	3,078

Source: Ekosgen (2008) An evaluation of the Yorkshire and Humber Manufacturing Advisory Service

Lessons

The brokerage model used incorporates three key features that have been instrumental in the success of MAS in the region. These are (i) responsiveness; (ii) flexibility and (iii) solution-driven.

The programme has enabled the companies that it has engaged with to modernise their production processes. However it also found that a more sophisticated approach to targeting companies, identifying and prioritising those with the greatest growth potential, could achieve greater market penetration.

The additionality of the programme has generally been high. The financial assistance that has been made available through MAS has enabled the majority of companies to implement an improvement project that they may otherwise have been reluctant to undertake. However, further benefit may be derived if the manufacturing reviews involved were revised to enable a comprehensive assessment to be undertaken of business needs rather than just production.

¹³ DTZ Consulting (2007) Evaluation of the Manufacturing Advisory Service

¹⁴ Ekosgen (2008) An evaluation of the Yorkshire and Humber Manufacturing Advisory Service

The 2003-2012 Regional Economic Strategy

Following the first of its regular reviews the 2003-2012 RES started to develop a more innovation-led approach to economic strategy¹⁵. It was again one of five cross cutting themes but for the first time it set out some specific objectives and deliverables focused on encouraging innovation and improving business and higher education links.

Yorkshire Forward responded to this through its 2004 Corporate Plan. This attempted to define the support further, moving towards a clear objective to drive innovation, enterprise and the growth of key clusters¹⁶. It made specific reference to the promotion of process and product innovation in businesses across the region and to the underpinning strength of relevant HE and research expertise (including the science base) in the region.

It sought to establish clear objectives relating to the roll out of a 'Knowledge RICH' initiative, increases in the exploitation of international technology and knowledge transfer and technology transfer, through Centres of Industrial Collaboration and introduced targeted innovation support to small and medium sized businesses. It also launched Grants for Industrial Research and Development, aimed at filling the gap in support available to large companies whose needs were not met by the GRD scheme. Despite this focus there were still no specific targets relating to innovation.

One of the issues that was beginning to emerge around this time was how far proximity mattered for work on innovation and clusters policy (see also module 9: sectors and clusters).

In hindsight, too many regional initiatives probably did adopt a default setting that sought to match businesses within the region to universities and other institutes that were also within it. Figures within government were right to question that approach, as businesses should not limit themselves to local centres if better expertise is available elsewhere. Equally, for businesses at one geographic extreme of the region or another, facilities in other regions may well be closer to them than some of those in Yorkshire and Humber. However, whilst applying a rigid boundary has its flaws, so does the assumption that distance does not matter. The Lambert Review¹⁷ concluded that for SMEs especially, they are more likely to access HE and network expertise if they are geographically closer to it.

The balance of how far to focus on local expertise against how far to collaborate with expertise further afield will be a key one for those working on innovation and sector development in the future, for instance in LEPs. It is easiest to focus on local alone as cross boundary complexities don't apply and partners are probably already known and expecting to be involved. But complementing that by building collaborations that stretch further afield and bring together greater expertise across a greater range of disciplines is likely to offer a better range of potential help for businesses.

¹⁵ Ekosgen (2010) Evaluation of the Grants for Research and Development (Final)

¹⁶ YF (2004) YF Corporate Plan 2004-2005

¹⁷ Lambert Review of Business-University Collaboration, HMSO, 2003

CASE STUDY: Centres of Industrial Collaboration:

The £11.6m Centres of Industrial Collaboration (CIC) programme was launched in 2003 to provide high profile business access to the world-class research facilities and scientific expertise contained within the region's universities. The CICs are designed to facilitate business-academia collaboration. For business, they provide a clear and accessible route to the know-how they need in order to innovate and compete. For universities, they break down long standing barriers that businesses face in interacting with the higher education science base and thereby open up a new commercial market for their research.

A total of 12 accredited centres¹⁸, were set up in three phases, providing support covering the healthcare, pharmaceuticals, chemicals and biotechnology, digital and electronics, food and drink and engineering sectors. The centres were accredited on the basis of scientific excellence and track record in knowledge transfer. An average of £200,000 per annum was awarded as a grant during the first three years of operation, after which the centres were required to become financially sustainable through commercial income generation. Each CIC has an industry specialist as a Commercial Manager, and a Centre Director who is internationally recognised in their field of science or technology.



Performance

By June 2008, the CICs had delivered 1,890 projects with business, grossed almost £11 million of industrial research income, levered additional research funding of £16 million, and created or safeguarded almost 600 jobs. The net impact on the region has been an additional £8.6 million of industrial income and £7.8 million of other additional income, with 111 jobs created or safeguarded. Overall, the programme has contributed an estimated net £16.6 million to regional GVA¹⁹. Further un-quantified benefits have been achieved in terms of the region's profile and reputation for high quality research.

Lessons

Overall the programme delivered greater commercialisation of university research and strengthened HEI links with business. However this was restricted to programme participants with limited influence on the wider business base, particularly its ability to improve Business R&D spend or influence a stronger culture of Innovation. This is likely to be caused by a mismatch between the regional business base and the CICs. It is therefore important that targeting is carefully considered.

The programme successfully addressed the supply side (i.e. HEI support), however evidence from the programme evaluation²⁰ would suggest that it is not the simply the supply of research services that lie behind the lack of activity and that alternative interventions may also be required to address the underlying causes of low levels of innovation amongst the regions businesses.

¹⁸ The 12 CICs are: Biomaterials and Tissue Engineering; Materials Analysis and Research Services; Particles; Polymers; Design Future; Engineering Design; Environmental Technologies; Food Chain; Pharmaceutical; Precision Technologies; Wireless Technologies; and Digital Printing

¹⁹ GHK (2008) Evaluation of Yorkshire Forward's Centres of Industrial Collaboration

²⁰ *ibid*

CASE STUDY: Knowledge RICH:

Knowledge RICH was established in 2002 to link businesses and HEIs by providing easy access to a database of regional experts and facilities to help better promote the capabilities of regional universities to business and help businesses find solutions to their innovation issues.



Performance

The programme had some initial difficulties, with some HEIs feeling as though Knowledge RICH had been ‘imposed’ on them by Yorkshire Forward following little or no input into the concept, ongoing development, or negotiation of targets. This affected its initial performance and the programme underwent a number of revisions running various iterations before settling on the final brokerage model that ran from 2005 through to 2009.

Despite this an evaluation undertaken for Yorkshire Forward in 2009 found that *“Knowledge RICH is seen as having enabled universities to engage more effectively with business and build relationships with the business community. It has also encouraged networking and the sharing of experience and best practice amongst the group of HEIs, and has led to improvements in KT [knowledge transfer] practice.”*²¹ This final operational model has now been translated directly into the front end of the new Innovation Voucher scheme.

The evaluation also concluded that *“Businesses that have gone through the entire Knowledge RICH process and have successfully entered into contracts with HEIs all (almost without exception) value the experience and the ultimate returns very highly. It has given them a better appreciation of what universities can offer, how to engage with them, greater confidence in ultimate success in their projects, and changed their perceptions of HEIs.”*

Lessons

There are many competing agendas within both HEIs and businesses. The experience of Knowledge RICH tells us it is important to ensure that; the parameters of the scheme are established early; there is buy in from all levels from within HEI’s; and client expectations are carefully managed. It is clear that there is a need to educate industry about the nature and limitations of research – being clear about what can and cannot be delivered to avoid any disputes about outcomes.

The role of intermediaries in promoting the service is clearly very important. They play a vital role in brokering the relationships and ensuring that all parties fully understand what is expected of them. Whilst the role of Knowledge RICH was to act as ‘honest broker’ there is evidence that a more proactive role would have benefited some of the user companies, e.g. by advising on the most appropriate institution or helping with negotiations. This was not possible given the limited resources and the generalist expertise provided²².

It also remains difficult for businesses and indeed the business support community to grasp the extent and variety of the offerings from the region’s universities. This problem was never solved during the lifetime of Knowledge RICH, and remains one of the issues for the new Innovation Voucher scheme²³.

²¹ Innovation Partnerships (2009), A closing evaluation of the Knowledge RICH service

²² Ibid

²³ Ibid

The 2006-2015 Regional Economic Strategy

Promoting innovation and R&D became much more explicit in the 2006-2015 RES. For the first time it set a clear target to double R&D expenditure from 0.5% of regional GVA (in 2002) to more than 1% of regional GVA by 2016. It also introduced another clear objective to “*foster innovation to develop new markets and products – including links between business and HEIs*” and included strong references to tackling what it perceived as changes needed in business culture, pointing out that “*Innovation is not always about high technology solutions and collaboration with HE can be complemented by internal activity*”. Recognising that “*good companies encourage their own staff to suggest ideas about how to do things better and often have their own research and development capacities*”.

Despite this clear intention, the 2007 Lord Sainsbury review of the UK’s Science and Innovation System stated a greater involvement was required of RDAs in encouraging innovation and building on the success of existing products by greater investment.

Yorkshire Forward responded and in 2008 agreed a Strategic Alliance with Yorkshire Universities committing the two organisations to collaborate across four strategic themes: (i) create, cultivate and exploit knowledge; (ii) support business growth and innovation; (iii) develop creative and enterprising people; (iv) promote the region internationally.

This collaboration, together with the Regional Science Council, Yorkshire Innovation, led to the launch of the Regional Innovation Strategy. This set out the ongoing approach to innovation. It included the refinement and continued operation of many of the activities already described as Yorkshire Forward and its partners sought to embed the activities into mainstream support and help them towards a sustainable model of operation.

CASE STUDY: Innovation Vouchers:

The Innovation Vouchers scheme provides SME’s with access to ‘vouchers’ worth up to £3,000. These can be ‘spent’ at Yorkshire’s universities and other academic institutions, purchasing knowledge and expertise which will help the businesses to innovate, compete and succeed.

Performance

Although in its early stages, take up of innovation vouchers across the region has been high. It is too early to analyse the benefits of this take up fully but initial reports suggest that the programme is having a positive effect and allowing business that would otherwise not engage in activity of this type to do so.

CASE STUDY: Bringing It All Together – Advanced Manufacturing Park (AMP)

The AMP at Waverley in South Yorkshire represents Yorkshire Forward’s largest collective investment. It brings together a host of high technology and specialised manufacturing businesses and has been highly successful in raising the profile of South Yorkshire as a centre of manufacturing excellence. Ten years ago South Yorkshire rarely even featured in peoples thinking yet now it is regularly at the top of the list and the first port of call for manufacturing expertise and investment. Part of this success has been down to the way in which the AMP provided a hub around which many high profile programmes were run including many of the successful innovation programmes discussed in this paper. By bringing them together in one place it made access by business and universities simple and enabled high levels of collaboration. It integrated work on sectors, innovation, investment, skills and the low carbon agenda, and would be hard to describe as a project rooted in any single agenda. That was also key to its success (see module 9: sectors and clusters for more detail on the AMP).

3. Resources, Results and Outcomes

Before considering the outcomes that have been achieved, it is important to reflect that whilst this paper is principally concerned with the response of Yorkshire Forward to the challenges set out in the RES, and the subsequent impacts it achieved, it is important to recognise that without support from organisations such as the region's HEIs, Yorkshire Innovation (the regional Science and Innovation Council) and the Technology Strategy Board many areas would not have progressed as they did.

So that said, how did they do?

For many years the level of R&D investment has been considered a reasonable proxy for innovation (recognised by its introduction as a key measure within the 2006 RES), and it is against this measure that we can most readily compare progress. However, when looked at through this prism we see little impact. Current levels of R&D expenditure remain stubbornly low at 0.5% of GVA and despite significant investment, it is clear that significant barriers persist and the region continues to underperform. On patents, where the numbers granted have fallen in every region (see section 1), Yorkshire and Humber is 7th of 9 regions. However, its rate of decline has been significantly lower than in any other region – a success of sorts, at least in relative terms.

It is therefore pertinent to consider two questions:

- Are the metrics by which we measure success the right ones? and
- What, if any, impact have the investments we have been making had?

It is increasingly being recognised that the metrics being used to measure and value innovation are inadequate and have severe limitations. The concept of innovation has changed over the last decade, moving from a linear, science and R&D based view to a more complex model, yet the methods of measuring innovation performance have not evolved at the same rate²⁴. Current measures are unduly influenced by industrial structures and much innovative activity is not captured by R&D spending²⁵.

We need to move away from an approach largely focused on the inputs and outputs (direct consequences), toward something that better captures the impacts on the region's businesses and economy. We need to recognise that innovation support can deliver significant outputs, but that such benefits can often accumulate over a prolonged period making it difficult to fully evaluate their true impact, and we need to ensure that mechanisms are in place to enable data to be captured over a much longer period.

In 2007 the UK government tasked NESTA (National Endowment for Science, Technology and the Arts) to develop a new Innovation Index which would better reflect the complexity of current thinking but still manage to produce outputs that are relatively easily understood, allow for clear benchmarking and for measuring trends in progress.

It is too early to tell whether this has had a significant effect on rankings but it is a significant step in the right direction. A better and more detailed understanding of impact can undoubtedly help to inform better and more targeted interventions that begin to address the root causes of underperformance in a way that we have yet to achieve.

So accepting that the overall indicators provide us with little in the way of evidence regarding the overall progress on raising innovation levels it is necessary to consider the individual interventions that were made.

²⁴ The innovation Partnership (2009) Innovation Metrics and Valuing Innovation in a Recession

²⁵ OECD (2006a), Economic Policy Reforms: Going for Growth 2006, OECD, Paris

One way of assessing this in the round is to consider the outputs and the return on investment generated by activities designed to support innovation.

Work undertaken by Regeneris consulting for Yorkshire Forward in 2010²⁶ showed that between 2007 and 2010 Yorkshire Forward invested in the region of £40 million in a broad range of activity to support Innovation. This is estimated to have generated an increase in GVA of between £130 million and £330 million (depending on the methodology used²⁷) representing a return of investment of somewhere between £3.6 for every £1 invested and £8.3 per £1 invested²⁸.

At first reading this is positive in its own right, but does not compare particularly strongly with many other policy interventions - e.g. wider business start up and wider business improvement whose activity demonstrate a much narrower and consistently higher range of return on investment of between £8.6 & £14.1 and £8.7 & £9.9 per £1 invested respectively. However, it is important not to jump to conclusions based purely on this evidence. We would advise that the figures in both calculations of GVA impact are treated with caution, given the wide range of assumptions that underpin them. The approach adopted by Regeneris mirrored that taken by PWC in their study on RDA impact²⁹, and focused principally on jobs created – converting this to GVA based on the average GVA per worker for the region. However, as mentioned above, the nature of innovation support often means that the benefits are likely to accrue over the long term and as a result may not be fully captured. This would have the effect of reducing the ROI figures particularly for the methodology based on YF outputs. Additionally the methodology does not take into account the higher salaries often associated with jobs created/safeguarded through Innovation support, with the effect that overall GVA is likely to be higher than estimated.

Over the same period (2007-10) innovation programmes were found to have:

- Created or safeguarded 2,772 jobs
- Supported 3,509 businesses
- Created 105 new businesses.

This data only provides a small window into what has been delivered over the course of ten years but gives an indication of the scale of impact achieved per £1 invested. It is also helpful to consider the more qualitative benefits and impacts that have been achieved.

a) Research and Development Grants:

Research and Development grants are felt to have been largely effective³⁰ supporting research into innovative projects that would otherwise not have been undertaken and enabling business to increase both R&D expenditure and skills as a result of investment.

Both GRD and IRD ('industrial research & development', which serves larger businesses), are well-known and well understood by the business community and are seen by business to have been a positive means to further develop both product and business, with some evidence that it can act as a catalyst for supported businesses, who often go on to access other forms of support.

The national evaluation of GRD and SMART³¹ found that in terms of employment and GVA effects, micro projects (i.e. those up to £20,000 in value) offer the best overall value for

²⁶ YF Policy Product Range Evaluation – Estimating Potential GVA, Regeneris, 2010

²⁷ see YF Policy Product Range Evaluation – Estimating Potential GVA, Regeneris, 2010 - Methodology 1 is based on national benchmarks and Methodology 2 is based on YF project Output data.

²⁸ YF Policy Product Range Evaluation – Estimating Potential GVA, Regeneris, 2010

²⁹ BERR/PWC (2009) Impact of RDA spending

³⁰ Fraser Associates (2010) for YF, Evaluation of evaluation evidence,

³¹ PACEC (2009) Evaluation of GRD and SMART

money. Feasibility/research projects offer better value for money than development projects in terms of employment, with the reverse being true for GVA.

Furthermore it indicates that the provision of grants offers significant additionality. It found that 70% of projects were wholly additional (i.e. they would not have gone ahead at all without GRD support) and a further 26% were partially additional (i.e. they would have gone ahead but later or on a much reduced scale).

It is less clear whether the Grants have been able to make a significant contribution to changing the culture of companies. While there is much evidence to suggest some meaningful outcomes have been achieved - e.g. IRD is thought to have helped generate total R&D expenditure of £25 million and increased sales by up to £526 million – it is inconclusive in terms of whether this has made a long term impact on innovation culture and longer term studies will be required to establish if this is occurring. What is clear is that market failure in R&D continues to exist and there remains a real and critical need to offer R&D support to businesses in the region³².

b) Knowledge Transfer and Collaborative Research

Overall, knowledge transfer activities have delivered increased commercialisation of university research and strengthened links between business and the HEI base for those participating in programmes across the region³³. The CIC programme in particular has helped to develop better alignment with business need and increased commercial awareness amongst the regions universities, who are increasingly recognising the need to align research with industry.

However evidence from the evaluation of CICs³⁴ suggests it is less effective at directly improving business R&D spend or influencing the culture of innovation, and that the benefits of the programmes are often restricted to programme participants, with limited influence on the wider regional business base. This suggests that alternative interventions may be required to address the underlying causes.

Furthermore it is thought that many of those involved would have continued the activity through private labs or in-house if CICs did not exist. And research undertaken by Experian³⁵ suggests that businesses tend to prefer the use of grant aid to support greater investment in R&D.

c) Business Support and Information:

Robust business support information is vital to the success of other strands of activity. If businesses are not able to access the right support at the right time then no amount of grant funding or research support will increase levels of innovation across the board.

Activities such as MAS have been successful at helping businesses to understand the issues they face and have enabled those they have engaged with to modernise their production processes and consider more broadly the benefits of undertaking innovative activities. However, evaluation evidence indicates that signposting and cross referral between support still has room for improvement. Doing so would strengthen the offer and ensure that the most appropriate solutions are found for the businesses involved.

³² Ekosgen (2010) Evaluation of the Grants for Research and Development (Final)

³³ GHK (2008) Evaluation of Yorkshire Forward CICs and Innovation Partnerships (2009) A closing evaluation of the Knowledge RICH service

³⁴ GHK (2008) Evaluation of Yorkshire Forward CICs

³⁵ Experian Business Survey (2007)

4. Insights and Lessons Learned

Innovation is almost universally considered to be one of the key drivers of productivity and economic growth yet there is largely still insufficient evidence available to give an unequivocal answer to the question of 'what works?'. Despite this, by considering both past and present initiatives it is possible to highlight some of the key issues that should be considered within project and programme design.

General Lessons

- a) **Establish a clear baseline:** It is important to be able to measure the success of interventions, yet current indicators are considered to be inadequate. For a long time proxy measures have been used to capture innovation performance. However there is increasing recognition that a broader set of indicators are required to fully capture the impacts generated. Careful consideration should be given to this at the outset.
- b) **Establish a clear rationale and strategy:** A clear rationale that properly considers and targets the underlying issues is crucial. It may be necessary to address some of the prevailing socio economic factors (e.g. lack of appropriate skills or a creative culture) first or at least alongside innovation promotion. Alternative interventions might be required to address the underlying issues.
- c) **Consider longer term impacts:** The commercialisation of R&D and the realisation of any associated benefits can take many years. Programmes often need to deliver quick results to establish their value with stakeholders, but this is often not possible within the timeframe of a project and it is important to be patient. A monitoring and evaluation framework that measures the impact over a more prolonged period might be beneficial. Expectations should be for long term benefits not quick wins.
- d) **Avoid working in silos or too narrow a focus:** Innovation is not just about universities or business R&D. Driving up innovation activity is as much about delivering a cultural change in both business and individual attitudes. It has strong links with the enterprise and skills agendas (e.g. a low 'absorptive capacity' in businesses can limit capability to understand and exploit externally generated knowledge or to understand internal needs and ask the right research questions)
- e) **Listen to Business (and Universities):** In order to be successful you must go beyond establishing economic policy and embrace a practical, industrial approach which is both understood and valued by business. This should have a clear focus on collaboration, commercialisation and finding and exploiting new routes to market. Over the years a key tool in Yorkshire Forward's box has been the ability to develop meaningful relationships with both academia and business and act as an intermediary to bring together the best of both worlds. Once there it's important to recognise there needs to be something in it for both sides.
- f) **Play to your strengths:** The lack of business R&D investment growth at regional level might, at least in part, reflect a lack of business stock in R&D intensive sectors. Activity needs to work alongside efforts to grow business and employment across key sectors. It is important to identify how innovation can assist those sectors that will not only grow in terms of output and employment, but may also give the region a competitive advantage in the global market. There are links to be made to a simplified business support offer and to supply chain development.
- g) **Integrate to innovate:** The ability to join up innovation work with other economic activity – for instance on sectors, investment, skills and the low carbon agenda – has

aided success. Equally, the potential for innovation is often greatest at the crossover between sectors, where fusing different expertise bases and organisations can spark innovation and growth.

- h) Don't lose sight of progress made to date:** The region has excellent Higher Education facilities, and the culture shift is now starting to take place on a larger scale, as a result of earlier policy that has proactively harnessed HE and business collaboration. It is important to build on this and not lose it.

Research and Development Grants:

- a) Build in sufficient flexibility:** The ability to work with the best institution, whoever and wherever they are, has significantly broadened the success of grant schemes.
- b) Focus on market and commercial opportunity:** Projects that do not have a specific market or commercial goals are less likely to be successful and will not derive the same benefits for the company.
- c) Consider the longer term impacts and build in appropriate levels of aftercare:** There are considerable time delays in realising benefits. Post project data capture (1-3 years down the line) would be beneficial in assessing more accurately the benefits achieved. Better follow up could help embed an innovative culture.

Knowledge Transfer and Collaborative Research

- a) Be realistic:** Knowledge Transfer is highly resource intensive. It is important to ensure the complexities and accompanying risk of under investment are understood and that management and support structures are fully in place before launching a scheme. The role of intermediaries is very important in ensuring all sides are fully engaged and understand any limitations on what can and cannot be delivered.
- b) Establish a clear rationale:** Many of the region's research strengths do not necessarily correspond to its industrial base. It is crucial therefore that careful targeting of sectors is undertaken to avoid any mismatch with the industrial base.
- c) Be proactive and flexible:** It can be difficult for business to understand the extent of support on offer from universities. If the information failures are to be overcome, then support must help businesses to differentiate and choose the most appropriate supplier. Balancing the greater range of expertise available outside a locality with the benefits of proximity, especially in connecting SMEs to HEIs, requires judgement.

Business Support and Information:

- a) Be demand led:** Business support must be responsive to needs, flexible and solution-driven. Clear signposting and cross referral between support mechanisms means there is 'no wrong door' in terms of business access is important for market penetration and delivery of the most appropriate solutions to business.

Alternative Solutions:

- a)** There are a number of clear and pragmatic interventions that could contribute to increasing R&D expenditure, for example; targeting Foreign Direct Investment activity exclusively on R&D projects would 'buy in' innovation. This is a high risk strategy that would need considerable resources and would not deliver immediate results, but does tie in with UKTI policy to target R&D investments for FDI activity.

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This paper is part of a suite of 'Learning Legacy' reports produced by Yorkshire Forward in 2011. The series is intended, as far as we can, to capture knowledge, achievements and lessons learned from regional economic development. It seeks to pass knowledge on to other bodies who may be able to apply it now or in the future.

We are grateful to all the many partner organisations, businesses and individuals who have contributed to this work over Yorkshire Forward's lifetime.

In addition to an Overview, the full range of modules in the series covers:

- 1: Economic Strategy
- 2: Research, Intelligence and Evaluation
- 3: Responding to Economic Shocks
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- 5: Enterprise - Helping New Businesses to Start and Survive
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Sheffield City Region LEP www.sheffieldcityregion.org.uk/local-enterprise-partnership

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Humber LEP (web address to be confirmed)

BIS Local <http://www.bis.gov.uk/policies/economic-development/bis-local-offices>

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