OLD INDUSTRIAL REGIONS (III) – POLICY BRIEF

'BRINGING CAMBRIDGE TO CONSETT?': ECONOMIC DEVELOPMENT POLICIES FOR UNIVERSITY SPIN-OFFS IN OLD INDUSTRIAL REGIONS

Dr Paul Benneworth
Centre for Urban and Regional Development Studies
University of Newcastle
Newcastle upon Tyne NE1 7RU
+ 44 191 222 8015
paul.benneworth@ncl.ac.uk

Introduction

In *Regions* 250 (April 2004), a research brief was published outlining a project examining at the impact of university spin-off companies (USOs) in less successful regions. The project is now complete, and the two case study reports have been finished and placed on the project web-site. In this short paper, I set out the background to the project, and then present three of the most policy-relevant findings along with their policy implications. It is clear from our research that university spin-offs can have an extremely beneficial impact in old industrial regions, but they are not a 'magic bullet'. The main problem for policy-makers which we identified was that the benefits are very diffuse, so it can be difficult to identify *how* to use a spin-offs promotion policy to its greatest effect.

At their best, spin-offs can prove that peripheral regions can be places where cutting edge science is performed in conjunction with its commercialisation, to the benefit of the national economy. This can help attract external investors – government, science councils and firms – in ways that help to bolster the knowledge-economies in these places. These large – often multi-million euro – investments can really improve the fortunes of these less successful regions. But of course, the problem remains that there can be no guarantee for a regional policy-maker embarking on a particular 'spin-out policy' that promoting spin-outs will result in a new bio-technology R&D centre or synchrotron in ten years time.

In this article, I explore those issues using two case studies where spin-offs have been used very effectively as part of a strategy of increasing the high-technology credibility of those regions. The two case studies are Newcastle in the North East of England, and Twente in the east of the Netherlands. In the article, I begin by reprising the key debates around spin-offs as an economic development policy, and set out a conceptual framework for evaluating the contribution spin-offs can make specifically to less successful regions. I then turn to look very briefly at the two case study regions, Newcastle and Twente, and highlight the main problems they face in building up competitive and dynamic modern economies. I then look very briefly about what has been done in each of those two regions, where in each case spin-offs have been part of university regional engagement policies for over two decades. From this, I use the case studies to set out some preliminary policy lessons which suggest how – in particular regional and local – policy-makers can promote spin-offs in ways that contribute to regional economic development.

USOs and the Knowledge Economy

Policy-makers have become very interested in the last decade in the idea of university spin-off companies as a means of promoting economic development, particularly in less successful regions. There is a consensus that 'knowledge' is increasingly important to competitiveness, and one problem facing such peripheral regions is that they often lack an industrial base which is strongly knowledge-oriented. This is a consequence of a range of factors – a dominance of branch-plants, a tendency towards older manufacturing industries, and the lack of a dynamic knowledge-intensive business service sector.

As governments seek to promote knowledge-based national economic competitiveness within constrained budgets, promoting spin-offs is highly attractive. Universities are much more evenly distributed spatially than other 'knowledge businesses'. In many countries they are dependent on state funding and so responsive to policy-makers demands. Universities have already invested in the knowledge base and so it is a 'free' return to past investment. Finally, many universities have developed regional development policies and so are willing to promote spin-off companies.

The obvious critique of the policy measure is that there is a huge difference in the economic circumstances in high-technology regions where spin-offs have had a regional impact (such as Cambridge, Öresund or Leuven), and such old industrial regions for whom those policies are now advocated. In the late 1980s and early 1990s, 'science parks' were seen as having similar benefits for less successful regions, but detailed evaluations indicated that they only really drove science-based development in already high-technology regions. In poorer regions, they tended to become luxury office developments, physically attractive but not acting as the growth poles which planners had intended.

It is possible to apply this critique to policies promoting USOs. The benefits of spin-offs depend on creating high-technology enterprises in regions which have economic environments which actively undermine enterprising behaviour, lacking readily-available finance, innovative skills, entrepreneurs and the supply chains necessary to support high technology businesses. There seem therefore to be natural barriers in expecting spin-off promoting policies to transform the prospects of old industrial regions. Indeed, a recent study from Germany showed that business services USOs from universities based in non-core urban areas tended to establish themselves in core cities rather than near to their parent institutions, thereby undermining the rationale for promoting spin-offs as a form of *regional* policy[1].

However, there are a set of case studies where spin-off companies have been associated with an *improvement* in the economic fortunes of particular less successful regions. At the recent RSA International Conference, Bent Dalum showed the linkages between the revival of the Aalborg region and university enterprise activity (*cf. Regions* 258). Likewise, Lund in Sweden, Tampere in Sweden, and Twente in the Netherlands have all been acknowledged to have had some kind of beneficial effect on their local economies through creating USOs.

Universities employ many high-quality and globally-renowned employees, they produce highly skilled graduates, and in many cases they have dedicated investment funds. The universities could conceivably provide many of the missing regional elements which act as a barrier to entrepreneurship in such places. The mechanism seems to be that the 'university environment' compensates in some way for the general weakness of the local economy.

Of course, although universities are large businesses, they are not necessarily profit-seeking businesses. So there is a question over whether these global/international academic assets can easily be converted into something with a regional benefit, given that many of the world-class academics may have no interest in regional activities. The discussion above suggests that one activity is through the university building an alternate culture for its enterprise activity, one based around promotion 'entrepreneurship' and profit-making. This must be done without undermining its key research and teaching missions which make it attractive both to world-class researchers and students. To help understand what policy-makers can do to stimulate innovation, we have developed a conceptual framework for the process by which spin-offs improve their local environment for entrepreneurship and innovation.

Regional Innovation Systems of Old Industrial Regions

Research was undertaken in two old industrial regions which had undergone severe industrial decline in the 1970s and in which universities had meaningfully attempted to contribute to regional recovery. The problem in both regions was that formerly dominant industries declined in ways that stopped new, successor businesses emerging, compared to the way that robotics emerged from mining (Sweden) or mobile telephony from metal manufacturing (Finland).

Large industries employing large shares of the workforce responded to their declining competitiveness by slowly shedding labour rather than investing in new high technology activities. Consequently, the industries did not lay the foundations for sustainable economic success, and shrank to shadows of their former selves. The regional manifestation of this particular problem was that these industries were dominant employers and so as those industries disappeared, the regions lost much of what provides industrial economies with their dynamism, highly skilled workers, business investment capital and R&D activities.

Because innovation is increasingly systematic, dependent on linkages between key actors, such less successful regions underperform in innovation – and hence competitiveness. The key problem for such regional innovation systems is that although there can be a knowledge producing base (universities and research laboratories) and a knowledge-producer base (firms), there are not the links between the two elements which would enable effective systemic innovation[3]. The idea then is that spin-offs' contribution to regional economic development comes by building better, stronger and more vital linkages between these two systems, shown diagrammatically in Figure 1 opposite.

In the research, we looked at four key sets of relationships in which USOs acted in some ways as a bridge between the university and the region, hence building up a stronger and more 'systemic' regional innovation system[2]. The conceptual framework is based on spin-offs improving those relationships through four key mechanisms, and that those improvements add up to a wider improvement in the regional environment.

- Internal university relationships between senior managers, industrial liaison officers and academics as the university learns how to commercialise,
- Relationships between the university and other companies, in which the university learns through its spin-offs how to work better with the companies,
- Relationships between spin-offs and other regional firms in which the spin-offs place knowledge from the university in those firms, and
- Relationships between the university and regional policy-makers, in which policy-makers learn from spin-off activity to create better regional policies.

The Two Case Study Regions and their Universities

Newcastle, North East England

Newcastle is the main city of the old industrial region of

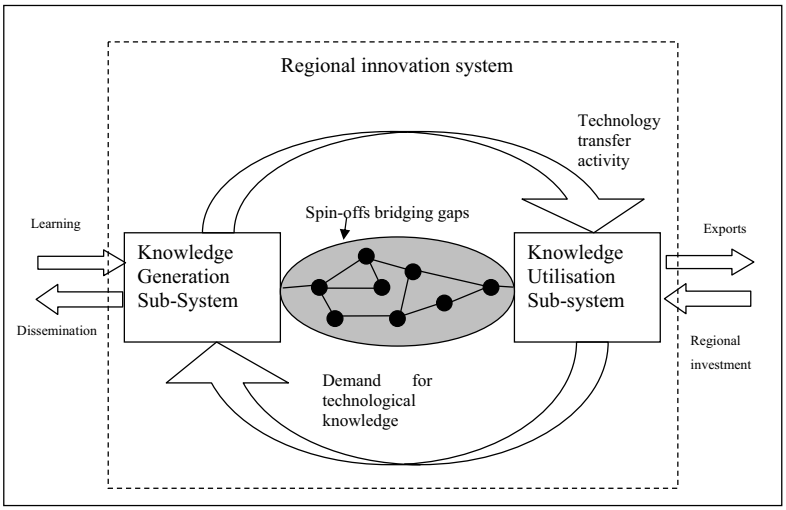

Figure 1: Spin-offs plugging gaps in a regional innovation system[4]

the North East of England, one of the first regions in the world to industrialise (from the 1780s onwards), and whose economic decline spanned the entire 20th century, to point of the virtual disappearance of its once-dominant coal, steel and ship-building industries. The university at Newcastle began as a marine technology college, supporting local firms, and its practical purposes have continued to this day through its close relationships with industrial partners.

Until the 1960s, although employment and the competitiveness of the industrial base dwindled, regional employment remained dominated by extractive and heavy engineering industries. From the 1950s onwards, UK government policy discouraged close linkages between universities and regional firms, requiring all licensing deals to be approved by a national body, the National Research and Development Corporation (NRDC). Although there were many *ad hoc* connections from the university into local firms, until the 1980s, the university did not really have a systematic policy for encouraging academic enterprise[5].

At the same time as the national commercialisation regulations were changed in the early 1980s, removing NRDC's monopoly, Newcastle University began to engage more seriously with regional innovation activity and spin-off promotion. The initial focus was on encouraging professors and lecturers to run businesses to commercialise research findings; the result was a number of hybrid research groups, all 'controlled' by one leading academic, but with a mix of Ph.D. students, post-doc research associates, commercial researchers, laboratory technicians and commercial development and sales staff. In some cases, people performed dual roles, being cross-subsidised between different commercial development and academic research projects. The 'academic founder' remained responsible for winning contracts, and ensuring delivering research, commercial and publication outputs, and in reality, there was evidence that the whole academic/commercial unit functioned as a single business, albeit with mixed aims.

The University of Newcastle upon Tyne
Photograph appears courtesy of Graham Peacock

Professor Van den Kroonenberg aimed to make knowledge flow between UT and the Twente region
Source: ubalpha.civ.utwente.nl/historisch_archief/990331695.jpg

This has remained the dominant model for spin-offs at Newcastle University, although it has been formalised in recent years with the creation of an Equity Committee to evaluate academics' business plans and draw up contracts to charge academics for commercial use of university facilities. Some of the research groups have actually left the university and set themselves up as independent businesses, having been 'incubated' within the university environment.

The university has achieved a great deal of successes from its spin-outs in recent years[6]; spin-offs have contributed greatly to the university and the region. Although the precise approach used by the university has varied, in particular in terms of the central enthusiasm for taking shares in businesses, the university has been a fertile environment for spin-off activity. The university also ensured that it has been able to benefit from that spin-off activity – because it is located in a region with few effective innovators with which to collaborate, the university faces the risks in business engagement of wasting time and money. Spin-offs have been used to help mediate that risk by building trust between the university and collaborating businesses.

Individuals in collaborating businesses have been brought into the wider university 'family' by involving them in institutions like the Equity Committee, Senate and visiting lectureships, to bring their knowledge of entrepreneurship into the university without undermining the university's strong position in international academic circles. Although spin-off activities are controlled very tightly centrally within the university, this is vital to ensure that the university is not destabilised as an institution, and to ensure the sustainability of its ongoing regional impacts.

Twente, the Netherlands

Twente is an old textiles region, whose industry dated to the Brussels uprising of 1830, when the Kingdom of the Netherlands ceded its main textiles towns of Brugge and Gent to the newly created Kingdom of Belgium. Twente's soils were too poor to permit subsistence agriculture, and its farmers had developed a range of other craft skills, including domestic hand loom weaving. Under the patronage of King Willem I, a strong textiles industry emerged in Twente, but suffered 'lock-in' from the turn of the century, as wages rose, colonial monopoly markets

crowded out other trade, and key textiles businesses failed to innovate.

From the end of WWII, the industry was shedding around 1,200 jobs a year (from 80,000) in textiles, and the Technical University of Twente (UT) was created in 1962 to revitalise the declining textiles industry. UT was created as an explicitly experimental institution, the Netherlands' only campus university; to avoid UT poaching lecturers from the two other technical universities, a number of industrialists were appointed to the professoriat, thereby to contribute to the national mission of developing strong technical and engineering services. Between 1965 and 1970, one-third of all textiles jobs in Twente were lost, precipitating a regional crisis and also jeopardising the industrial mission of the university. UT reinvented its mission in response to this, focusing on diffusing its knowledge base as new technology into regional firms, rather than supporting the moribund textiles industry.

The most famous aspect of this was the *Tijdelijke Ondernemers Programma* (TOP, Temporary Entrepreneurs' Scheme) which has created 3000 jobs in its first twenty years[7]. These firms were founded – mainly by UT graduates – who worked with a university research group for one year to develop a business plan. The scheme was highly successful, and a number of other developments took place in response to the emerging number of high technology small firms it produced. An American computer company was persuaded to invest in a Business Technology Centre (BTC) adjacent to the campus, because there was a need for accommodation for these high-technology firms.

The municipality was persuaded to redevelop the area around the BTC as a 40 hectare Business and Science Park because growing TOP-firms needed accommodation near the university when they outgrew the BTC. The regional development agency was persuaded to created an innovative growth venture fund (Innofonds) because of the rising number of businesses with good business plans needing growth finance. The university established a networking organisation, the Twente Technology Circle (TKT) to help TOP firms sell to large regional businesses; entrepreneurs took over the TKT after two years, and developed it into focussing on managing collaborative innovation support programmes.

A key element of the UT approach has been the separation of the professoriat from the entrepreneurial activity; the majority of the firms are founded as being totally independent from the university in employment terms. A number of the firms have grown to become important innovation actors in their own way, complementing what the university does, and helping other firms – particularly high-technology start-ups – to deal with the problems of business foundation. The TOP programme uses previous alumni to provide advice to new business founders, and the TKT also provides a means for potential entrepreneurs to discuss their business plans and to improve them to help them find finance. This approach has been very 'hands-off' from a university perspective.

Recently, UT has developed an alternative, active technology commercialisation mechanism, the so-called Knowledge Accelerator model, in which staff are funded to commercialise an idea within a company partly owned by the university. However, the central feature of the Twente model to date has two parts: firstly, the university has opened itself up as a home for entrepreneurs, then secondly, the university has used the spin-offs which have later emerged from this openness policy, to portray itself as an entrepreneurial university. This has enabled UT to persuade investors – both government and private sector – that investing in activities for SMEs and commercialisation will produce profits and desirable policy outcomes.

Policy Implications

1. 'These things take time'

The most notable observation about the promotion of spin-off activity in both cases is that it has been a long-term process. Taking any five year period in the last twenty, progress at both of the institutions appears unremarkable and somewhat pedestrian. However, taking the twenty year perspective, in both cases there has been a dramatic regional impact, although of course related to other economic development activities. Both regions have reinvented themselves as places with world-class skills in some high-technology areas – Newcastle has been designated a Science City by the UK government, and Twente has been awarded one of only three science parks of national strategic importance by the Dutch Government.

Spin-offs have been an important element of this regional reinvention, because they have demonstrated that knowledge can be profitably commercialised in these places. In Newcastle, they have been 'sheltered' within the university because of the general hostility of the environment towards entrepreneurship, but have increased the scope of what the university could do. In Twente, small, local networks have built up, but these have been 'piggy-backed' on by others to build larger, more globally-competitive activities. The activities have built up slowly, but the building up process has given strong supportive networks which anchor regional innovation assets more strongly in the region.

2. Commitment from the university

What has underpinned the longevity of spin-off policies given the long incubation time for success is that in each case, the university has been committed to regional engagement, and spin-off promotion, for a long time period. In the case of UT, this was driven by a Rector Magnificus, Professor Harry van der Kroonenberg, who committed the university to spin-off promotion activity effectively for nine years; his success of this encouraged other Rectors to continue this support. Likewise at Newcastle University, regional engagement has been a

core mission since the early 1980s, when together with the Polytechnic and the City Council, they funded a city technology centre (1984); Newcastle University was a key founder of Higher Education Support for Industry in the North (1989); they appointed an executive board member with responsibility for regional development (1999); and finally, they appointed an explicitly entrepreneurial Vice Chancellor to develop the post (2001).

In each case, the university has supported spin-off formation because there has been a 'pay-back' for the university's other missions, teaching and research. At Newcastle, the expanded 'research businesses' have a much greater research productivity than were the research groups purely academic, and many spin-offs have put research funds back into the university. At UT, spin-offs have been used as a political tool to help the university access funds from external partners, in particular the regional development agency and central government, which is particularly important because UT is a relatively small institution without a medical school.

3. Using spin-offs 'constructively'

In both regions, the total direct economic footprint of the spin-off companies is small, with USOs employing a few thousand people and with relatively few linkages to other regional businesses. Spin-offs have however made an observable difference when they have been used to build up other supportive activities and it is these supportive activities which have a broader regional impact. The best example of this is the case of the TOP programme, which has been built into a sequence of larger projects culminating in the national government recognising 'the University of Twente's expertise in spin-offs' as an asset of national strategic importance, rewarding it with a special science park[8].

A similar issue can be seen in Newcastle, where the university used strategic reserves to fund a commercially focused nanotechnology-professor; he won European – then national government – funding for a research facility, which he then also used to incubate spin-offs as part of a portfolio of technology transfer activities. When the UK government were criticised by Parliament for failing to exploit nanotechnology, Newcastle University was given a large government grant for commercialisation, again recognising their expertise as something of national significance – and the university's record in spin-offs was one factor in winning that grant.

Although the two examples cited are both from the public sector, in both Twente and Newcastle, spin-offs have been important in attracting large external inward investments who want to work with the spin-outs, but which have much larger impacts on the regional innovation environment. What was 'constructive' in each of these cases was that the investments won funded more generally-available resources for innovation and entrepreneurship in what were otherwise relatively poor innovation environments.

About the author

Dr Paul Benneworth is a Research Councils UK Academic Fellow at the Centre for Urban and Regional Development Studies, at the University of Newcastle upon Tyne. This article draws upon research funded by the ESRC as 'Bringing Cambridge to Consett? University spin offs in the periphery' (Grant RES-000-22-0659) as well as a research project undertaken for the Newcastle University Business Development Directorate. The author is grateful to David Charles, Aard Groen, Gert-Jan Hospers and Catherine Hodgson for their contributions to these research projects, although any errors or omissions remain the responsibility of the author.

The project website is available at:
http://www.staff.ncl.ac.uk/p.s.benneworth/test.htm

Notes

1. Elgen, J., Gottschalk, S., & Rammer, C. (2004) 'Location decisions of spin-offs from public research institutions' *Industry and innovation* 11 (3) pp.207-223.
2. Benneworth, P.S. & Charles, D.R. (2005) 'University spin off companies and the territorial knowledge pool: building regional innovation competencies?' *European Planning Studies* 13 (4) pp.537-557.
3. This argument draws on a categorisation developed by Phil Cooke: Cooke, P. (2005) 'Regionally asymmetric knowledge capabilities and open innovation: Exploring 'Globalisation 2' – A new model of industry organisation' *Research Policy*, forthcoming.
4. Benneworth, P. & Hodgson, C. (2004) 'Scrutinising science policy? lessons from the New and Renewable Energy Centre' *Report to the 'Strategy for Success' scrutiny panel*, Newcastle: CURDS.
5. Potts, G. (1997) 'Towards the Embedded University?' *Unpublished PhD thesis*, Centre for Urban and Regional Development Studies, University of Newcastle upon Tyne.
6. Benneworth, P. & Hodgson, C. (2005) 'Towards a 'Newcastle Model': lessons from university spin off activity at Newcastle University' *Report to the Business Development Directorate, University of Newcastle upon Tyne*, Newcastle: CURDS.
7. Sijde, P. v.d., Karnebeck, S & Benthem, J. v., (2002) 'The impact of a university spin off programme: the case of HTSFs established through TOP' in R. Oakey, W. During, & S. Kauser, (eds) *New technology based firms in the millennium: volume 2*, London: Pergammon.
8. MINEZ (2004) '*Pieken* in de delta': Den Haag: MINEZ.