

The Good, the Bad, and the Ugly: Triple Helix Policies and Programmes in Wales

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Abstract

This paper examines regional innovation policy from the perspective of the Triple Helix theory of innovation. It utilises this theoretical approach to analyse and evaluate innovation policies and programmes implemented in Wales, a weaker region of the UK. As well as utilising the Triple Helix theory to inform research into the Welsh innovation system, the findings from the Welsh case study are used to interrogate the theory itself and provide some insights as to its applicability in the context of a weaker region. It finds that Triple Helix approaches have featured prominently in Welsh innovation policy and programmes since devolution, with mixed success. Stakeholder evaluations revealed that Triple Helix approaches are generally popular with actors from the university spheres but do not feature highly on the agenda of the Welsh business sphere. We use these empirical findings to question the appropriateness of Triple Helix approaches in weaker region, finding that although they can provide a useful addition to the innovation policy mix it could be unwise for government to focus too heavily on universities as drivers of innovation and economic development at the expense of the business sphere.

Keywords: Innovation policy; university-business linkages; Triple Helix programmes.

Introduction

This paper examines government policy relating to innovation in Wales; specifically policies and programmes relating to the “Triple Helix” aims of increasing university-business-government interaction and maximising the economic impact of a region’s universities. This paper consists of the results of a case study conducted in a weaker region of the UK, Wales, and aims to plug a gap in the literature on innovation and the Triple Helix, which seldom examines weaker regions within developed countries. Indeed, many of the key concepts advanced by the Triple Helix theory have been developed in “stronger” regions or countries where universities’ activities have been fundamental in driving economic growth and/ or development. The aim of this paper is to provide a comprehensive overview and evaluation of policies and programmes in Wales that have followed the rationale and design proposed by the Triple Helix theory of innovation, and to feed these findings back into the interrogation of the theory itself. Specifically, it presents a policy and programme analysis triangulated with interviews with key stakeholders to provide an analysis and evaluations of Welsh innovation policy since devolution. This paper addresses the following questions:

- 1) How has innovation policy in Wales evolved since devolution, as analysed through the Triple Helix theory of innovation?
- 2) Which programmes have been implemented in Wales and how are they evaluated by key stakeholders from the university, business and government spheres?
- 3) What does the Wales case study teach us about the application of the Triple Helix approach to innovation in weaker regions?

Firstly, the theoretical background within which this study sits will be discussed. The key concepts of innovation and innovation policy will be defined, the geographical focus on the “region” explained, and the Triple Helix theory introduced. Then, an overview of the evolution of Welsh innovation (and related) policy will be provided followed by an

introduction and evaluation of specific programmes implemented in Wales following a Triple Helix approach to innovation. Finally, some conclusions of this analysis will be provided, which feed into the theory itself and question its usefulness as a framework for innovation and economic development in a weaker region of a developed country (Wales, UK).

Theoretical Background

This section situates the paper within the wider academic literature in the sphere of innovation and economic geography. The importance of innovation is discussed, and some definitions provided to explain what we mean by innovation in this paper. Then, innovation policy is introduced and defined. The next section looks at the role of the region as a key focus in the analysis of innovation and innovation policy; and finally, the theories of interactive innovation are introduced with focus on the Triple Helix model of innovation as the theoretical framework that this paper uses to analyse innovation policy in Wales.

Innovation

Firstly, it is important to explain the definition of “innovation” that is being utilised in this paper. Innovation as a concept has a strong foundation in economic literature, and is often traced back to the work of Joseph Schumpeter (e.g. 1934’s *The Theory of Economic Development*). A good modern definition of innovation is provided by Haskel et. al. (2009):

“[Innovation is] the contribution of all forms of knowledge to growth, as opposed to the contribution of investment in physical inputs and labour”.

An even wider definition of innovation is provided by Borras & Edquist, who look beyond the purely economic aspects of innovation:

“Innovations are defined here as new creations of economic and societal significance, primarily carried out by firms (but not in isolation).” (2013, p.3)

The former is the definition that this study takes; whilst the societal aspects of innovation are recognised as important and warranting further study in weaker regions this is beyond the remit of this paper, which focuses on innovation as a driver of *economic* development.

Innovation can be radical or incremental, and the work on Systems of Innovation (Edquist 1997, 2001, 2005) made key strides correcting perceived wisdom and defining innovation as interactive rather than linear (Cooke, 1998, p.24). We can see innovation lying at the core of growing regions; if a region can innovate it will be more competitive than a region that cannot.

“There is a widespread agreement in academic literature that knowledge, learning and innovation are key to economic development and competitiveness for firms, regions and nations.” (Tödtling & Trippl, 2005, p.1203)

Innovation Policy

As our understanding of innovation and its crucial role driving economic development has enhanced, it has become an increasingly important area of policy making. Indeed, McCann & Ortega see regional innovation policy accepted into the “mainstream” of public policy today, as a result of over four decades of analysis that has reshaped our understanding of the role innovation plays in economic development (2013). Following on from the definition of innovation it is important to explain what is meant by “innovation policy” in the context of this study. The definition of innovation policy provided by the European Commission is:

“Innovation policy is about helping companies to perform better and contributing to wider social objectives such as growth, jobs and sustainability” (European Commission, 2012)

But the definition taken in this paper is that provided by Borras & Edquist, which accounts for other policy areas and actions affecting innovation but which are not necessarily labelled as such.

“Innovation policy comprises *all* combined actions that are undertaken by public organizations that influence innovation processes...Innovation policy thus **includes** actions by public organizations that **unintentionally** affect innovation.” (2013, p.3)

The rationale for innovation policy is to address market failure and also system failures such as “lock in”, “fragmentation” and “organisational thinness” (Tödting & Trippel, 2005; McCann & Ortega, 2013). Based on the growing body of literature around innovative regions, clusters, and knowledge spillovers, a new model for policy has emerged stressing: high tech, knowledge based, or creative industries; building up research excellence; attraction of global companies; and stimulation of spin-offs (Tödting & Trippel, 2005, p.1204). Whilst recognising the potential strengths of this innovation policy approach, these authors argue that it is used in “an undifferentiated manner for all kinds of regions” rather than taking into account the specific strengths and weaknesses of different regions. They assert that “policy conclusions which are drawn from the analysis of “success stories” are only of limited use for less favoured regions, as their innovation capabilities deviate in many respects from these “role models” and call for more differentiated innovation policies, dealing with specific innovation barriers in different types of regions (Tödting & Trippel, p.1204).

The Region

Literature within economic geography tells us that changes observed in the global economy have altered patterns of economic growth and development, and also brought on societal changes, resulting in prosperity for some parts of the world and decline for others. Many authors have emphasised the importance of regions within this new economic geography. For

Uyarra “One key rationale underpinning regionalist thinking is that global economic restructuring is reinforcing *the region* as a fundamental locus of economic governance.” (2007, p.244, emphasis added). Florida (1995) also sees the importance of the region growing as globalism and regionalism evolve as part of the same process of economic transformation, and regions function as effective points of entry into the global economy. Scott and Storper explain how regions are crucial due to the importance of agglomeration in the globalized world:

“Large scale agglomeration and its counterpart, regional economic specialisation, is a worldwide and historically persistent phenomenon that is intensifying greatly at the present time by forces unleashed by globalization.” (2003, p.588).

As the insights regarding innovation policy that are presented above suggest, the regional level has become an important sphere of analysis of innovation policy, and we can see the emergence of “regional innovation policy” over the last couple of decades (McCann & Ortega, 2013). These authors see a widespread re-thinking of innovation during the 1990s, which emphasised the regional aspects of innovation and that the geography of innovation and growth appears to be closely connected to the “relatedness of emerging technologies and skills” at the regional level.

This report focuses on innovation and economic development in the regional context, to provide insights at this geographical level. Specifically, it contributes to our understanding of innovation policy in the context of a weaker region of a developed country. This paper asserts that the Triple Helix requires greater testing and empirical investigation in this specific context. In brief, Wales is defined as a weaker region due to its status as a recipient of Convergence funding (the highest level of Structural Funds available to weaker regions

within the EU) and languishes at the bottom of UK competitiveness tables (Huggins & Thompson, 2010).

Interactive Innovation Theories & the Triple Helix

As our understanding of innovation has evolved towards a more systemic approach, appreciating the evolutionary and interactive nature of the innovation process, a number of different theoretical approaches have emerged in the literature that focus on the interactive aspects of innovation. These approaches include the Learning Region, clusters, RIS & other systemic approaches, innovative milieu, network based approaches (references for each one). The interactive innovation theory this study chooses to examine in more depth in weaker regions is the Triple Helix.

The Triple Helix theory, as introduced by Etzkowitz & Leydesdorff, posits that interactions between the three spheres of university, industry, and government drive innovation in the knowledge economy. The theory places universities at the heart of the innovation system, and allocates a crucial role to their third mission activities (see Etzkowitz & Leydesdorff, 1997; Etzkowitz & Leydesdorff, 2000; Etzkowitz & Ranga, 2010 for detail on the Triple Helix theory). Following the theoretical understanding of the Triple Helix theory, policies that aim to increase interaction between the different spheres for economic benefit or to encourage universities' third mission activities have been categorised as Triple Helix style interventions; these policies and programmes are evaluated in this paper.

In the Triple Helix literature we can find some examples of where policies and programmes have been implemented to encourage the greater interaction of university, government, and industry for the purposes of encouraging innovation (Etzkowitz et. al. 2005; Etzkowitz & Ranga, 2010). Specific examples are given of cases where a mixture of university,

government, and industry leadership has been achieved by Etzkowitz & Ranga (2010, pg.18) and Etzkowitz et. al. (2005).

A number of important studies have revealed the key role that universities play in driving innovation systems, most notably in Silicon Valley (Saxenian, 1994). The Triple Helix has also been studied and found to be relevant through case studies in developing nations such as Brazil (Etzkowitz et. al. 2005). The only study of Wales is Huggins et. al. (2008), which examines the Triple Helix from the perspective of the university sphere. They find that a “burden” is being placed on Welsh universities to play a more prominent role in driving the regional development agenda, and that this burden is too heavy. They suggest that establishing publically funded research institutes in Wales (which are notably lacking) could take some pressure off the Welsh universities.

The Triple Helix theory of innovation has been selected as a framework through which to analyse innovation policy in Wales. This paper examines the evolution of Welsh innovation policy and programmes from 1999 to the present day, and identifies the Triple Helix approaches that have been followed. It analyses and evaluates programmes that aim to drive innovation through increasing the collaboration between the university, industry and government spheres, and spinning out knowledge and innovation from universities. Such programmes have been an important part of the Welsh Government’s approach over the last decade, receiving a significant portion of the resources devoted to innovation activities. In light of this, it is important to examine these programmes in depth and use findings to feed back into the study of innovation policy and also our understanding of the Triple Helix and innovation more generally in weaker regions. Only rigorous interrogation of policy and theory can we hope to advance the subject and improve the effectiveness of government’s efforts to drive economic growth in the regions that most need it.

Context of Case Study

There are two important elements to the Welsh case study that makes it particularly interesting and worthy of further study: Wales as a weaker region within a developed country (the UK), and Welsh Government as “devolved” from the central UK government and so has developed its own innovation and economic policies from 1999 to the present day. Firstly, Wales is defined as a weaker region in this study due to the fact that it is bottom of the UK competitiveness tables (see Huggins & Thompson, 2010). Also, half of Wales (West Wales and the Valleys) qualifies for Convergence funding, the highest level of Structural Funds from the EU.

Methodology

The overarching approach of this paper follows that of the case study (Yin 2009), Specifically it combines policy analysis and stakeholder interviews to provide a comprehensive evaluation and discussion of Welsh innovation policies and programmes. The time range of the study is from 1999 to the present day. The policy analysis was triangulated with 57 anonymised , semi-structured interviews were conducted with key stakeholders from the business, government and academic spheres in Wales. The purpose of these interviews was to gain the perspectives of the different stakeholders involved either in the formation, delivery, or “use” of innovation policy on how it has evolved and their evaluations of the specific actions taken.

Innovation Policy in Wales

There has only been one innovation policy in Wales to date (*Wales for Innovation, 2002*), with another to be published imminently. However, innovation has featured in the economic policies throughout the period (1998, 2002, 2005, 2010), specific sector strategies and also in

the general strategy documents. Innovation has also been a key theme in policies relating to higher education in Wales, which display strong Triple Helix elements in enhancing the economic role of Welsh universities. Indeed, universities are key to the Welsh Government's innovation agenda, and are relied on as drivers of innovation and economic growth in Wales. Innovation policy in Wales has an interesting history due to Wales' role as one of the first regions in Europe to develop its own innovation strategy. When we refer to "innovation" policy in Wales we are talking about one actual labelled innovation policy, but also the wider economic, education, and general strategic policies covering innovation.

"Policy-makers felt that the best solution to [Wales' poor performance in economic league tables] was the development of a coherent co-ordinated approach to innovation via a regional strategy, involving all key actors. As a result, Wales became one of the first regions in Europe to develop a regional innovation strategy, a trend since followed by other regions" (Jones-Evans & Brooksbank, 2000, p.2).

The *Regional Technology Plan* (RTP) was framed as one of a new generation of regional innovation policies created by the EU, and its basic aim was to raise innovation capacity in less favoured regions, which had previously been largely sidelined by policies which concentrated resources in already innovative regions. From the outset innovation in Wales took a systemic approach to innovation with the RTP attempting to build innovation systems in the poorest regions in Europe. Wales was selected in 1994 as one of eight pilot areas for the RTP, which was seen as a success and was rolled out across Europe under a new name of *Regional Innovation Strategies* (RIS). The programme recognised that it is not enough to simply build research and technology infrastructure in weaker regions, but that systems and networks are needed to promote innovation.

The RTP, being the first innovation policy dedicated to Wales, set the innovation agenda in the direction of a systemic approach. This was built upon by the *Entrepreneurship Action Plan* in 1999 and the *Innovation Action Plan* in 2002; these policies again viewed innovation in a systemic and evolutionary fashion, addressing the culture of Wales to make it more innovation and entrepreneurship friendly. However, these were the first and last dedicated innovation and entrepreneurship policies in Wales, and the policy agenda moved towards more general economic strategies in the mid 2000s.

We can see the diminishing importance of the systemic approach to innovation around this time as a more Triple Helix based approach emerges in the policy. Instead of innovation and entrepreneurship policies driving the innovation agenda, we see the mid 2000s dominated by economic strategies and higher education policy. The first introduction of Triple Helix approaches in Wales can be seen in *Reaching Higher* in 2002, which was the first higher education specific policy highlighting the importance of HEIs to the Welsh economy and society more generally. But it was *Knowledge Economy Nexus* in 2004 that took an explicitly Triple Helix approach of enhancing the university-industry linkages conceptualising them as the two “key strands” of the Welsh economy, approximating the Triple Helix language. The Triple Helix approach was further strengthened by the science policy, *Science Policy for Wales*, in 2006, and *Commercialisation in Wales* in 2007 which called for fewer but more strategic initiatives to support commercialisation of research. Innovation specific policies are largely lacking in this mid-section of the study period with innovation featuring mainly in the higher education and science strategies and also *WAVE* (2005), the economic strategy.

Recently, Welsh economic policy has moved towards a sector based approach, structured around supporting certain sectors that have been selected as the key drivers that the Welsh Government has the potential to positively support. These nine sectors selected following the publication of the ERP in 2010 include ICT, life sciences, tourism, construction, and creative

industries. From a Triple Helix perspective the sector based approach taken in Wales is interesting because of the multi stakeholder structure that has been put in place for advising on each of the different sector strategies and feeding into the Welsh Government's work. The Welsh Government's business and economy department has been restructured into sector teams, which develop policy and deliver support and services to their sector; alongside but separate from the sector teams sit nine sector panels made up of experts from the business and academic spheres.

The sector based approach was also a key feature of 2012's science policy, which as with the last science policy in 2006 has a strong Triple Helix rationale throughout because it ultimately aims to increase the wider economic impact of science activity, usually carried out in universities. There are four sectors chosen in the science policy as "Grand Challenges", similar to some of the ERP's sectors but certainly not corresponding directly. Three of these Grand Challenge areas are similar to the priority sectors: life sciences and health; low carbon, energy, and environment; and advanced engineering and materials. So, activities around the commercialisation and exploitation of research, development and innovation in these areas are strongly supported but what about activities outside of the priority sectors? Is it possible that we could see a Triple Helix evolving around certain sectors where support has been prioritised whilst others are largely sidelined; in effect a Triple Helix with peaks and troughs around where support is delivered? It is too early in the lifespan of the sector based approach to supporting innovation in Wales for us to be able to answer these questions because the approach has only been in place for two and a half years, and for much of this period restructuring was taking place.

“Triple Helix” Programmes in Wales

Having examined the evolution of innovation policy in Wales through the lens of the Triple Helix theory, this paper examines some specific policies that have been implemented during the study period. The primary stage was to evaluate which were the most important or significant programmes relating to innovation over the last 15 years. This was a two-stage process: firstly, programmes were identified through policy analysis and their importance established according to the resources devoted to them and how prominent they are in the policy documents. Secondly, stakeholders from the three spheres were asked about the most important programmes (successful or unsuccessful) within the time period. Over forty different programmes were identified by stakeholders as important to the innovation agenda, but the number selected for analysis in this study is much smaller. Only the programmes that were highlighted by at least two stakeholders from different organisations were chosen to minimise the risk of stakeholders assigning greater importance to the programmes that they are involved with.

There are three major programmes that have been linked to the Triple Helix approach to innovation; they aim to create or strengthen links between the three spheres (primarily academia and business) or to increase the knowledge-transfer or spin-outs from universities. In fact, these three programmes are three of the most significant innovation related programmes in Wales in terms of their scale and duration; Triple Helix programmes have been central to the Welsh Government’s innovation agenda following devolution.

An introduction will be given to each programme explaining the basis and a summary of stakeholders’ evaluations provided before some conclusions are made about the Welsh Government’s attempts to drive innovation in Wales through Triple Helix approaches.

Technium

Probably the most high profile innovation intervention over the last decade in Wales is the Technium programme, which features in all of the economic strategies and represents a significant infrastructural investment. It has also received a high degree of media coverage in Wales due to the perceived failure of the programme and amount of financial resources dedicated to it. The first Technium was created in 2001 in Swansea, and the IAP of 2002 had the creation of a nationwide Technium network at its heart. The total development cost of the 10 Techniums was £93.4m and 89% of this was funded by the public sector, with use of EU Structural Funds (DTZ, 2010, p.iv). The Technium programme provides high-tech office space and support for high tech firms to commercialise research and turn this into economic growth. It is aimed at university spin-offs and high tech firms and began its life as an alliance between the universities and the WDA, which was subsumed into the Welsh Government in 2006. The rationale behind the programme was that the universities have expertise in IP, and the WDA (later the Welsh Government) in physical property and business support; the programme was designed as a combination of these elements and in bringing the three spheres together corresponds to Triple Helix policy approaches.

At the programme's peak, there were 10 Techniums across Wales, but this has recently been cut down to 4 because of high costs and low occupancy rates. The Technium programme can be viewed as a Triple Helix programme because it is funded and supported by government, and aims to assist private firms in commercialising both private and university research. As well as following the Triple Helix approach to innovation, the Technium programme is concerned with building the appropriate high tech infrastructure to create a knowledge-based economy in Wales.

These cuts suggest the programme was too ambitious. There have been previous analyses and evaluations of the Technium network, and some of the key points are worth summarising to highlight the weaknesses of the approach. Cooke & Clifton (2006) explain how the scheme was overambitious because it assumed that over 400 incubator spaces could be filled, which was not the case especially in more rural areas of Wales. They explain how the buildings were not in themselves innovative and just replicated old incubation approaches; the focus on management assistance and advice became lost leaving the programme as little more than a property development initiative (Cooke, 2003). An evaluation of the Technium programmes was commissioned to be carried out by DTZ consultancy firm, which revealed that each job in the Techniums cost an average of £190,000 of public money, and occupancy rates at Technium Pembrokeshire were as low as 4% (DTZ, 2010). On the other hand, although the cost per job seems very high, the jobs tend to be graduate, R&D based positions, and form the basis for more high value added growth in the future (Bristow et. al. 2007). Overall, the DTZ evaluation was highly critical of the programme and had five key findings: firstly, there was no clear rationale for the roll-out of the programme beyond the first incubator in Swansea; there were no explicit objectives for the programme; monitoring and evaluation by Technium managers was practically non-existent; occupancy rates were very low; and the provision of business support and its take up was minimal.

Bristow et. al. defend the original idea behind the Technium investment because it facilitates university-business knowledge transfer thus “laying the basis for a new knowledge economy” (2007, p.25), but we suggest that this has not transpired. In light of the considerable roll back of the scheme, we can see that the programme has not been an overall success. Although four Techniums remain, the future of these is somewhat uncertain; in January 2012 the Western Mail reported that the future of the Swansea Digital Technium is under question because existing tenancies are coming to an end in 2013 and no new leases have been granted

As for the cause of the programme's lack of success, some stakeholders have made observations as to why this may be the case. One of the founders of the programme, explained that "poor leadership and failure by universities to buy into the scheme stymied its chances", and universities were more interested in creating IP than exploiting it. Also, the WDA went ahead with building Techniums across Wales too rapidly, before the lessons had been learned from the first Technium in Swansea. From the ministerial perspective, Andrew Davies (former Economic Development Minister) blamed failings by senior civil servants in his department; "the concept was sound...the management and roll-out was deficient", and insists despite their claims otherwise, that civil servants did not keep ministers informed on the performance of the programme and major decisions being taken (Davies, 2012). Morgan expresses his surprise that there has been no public inquest into the "failure of an experiment that cost around £111 million (2012, p.16). It is perhaps unsurprising that the Technium programme was widely discussed by stakeholders interviewed due to the media coverage of the programme and its prominence in policy and political statements as one of the Welsh Government's flagship programmes of the last decade. Many of the comments relating to the Technium were negative, especially from the academic community.

I think the Technium network, which has been well document is not one of the greatest examples of what we have to show to the world. (University 10)

Most respondents recognised that the original idea behind the Techniums wasn't necessarily a bad one, but it was the expansion and delivery of the programme that was problematic. Some stakeholders have identified a mismatch of supply and demand as a key problem, raising questions over the location of the centres and whether there are enough high growth businesses in Wales to fill the spaces. We suggest that this is a potential problem with Triple Helix approaches generally in that if there is not sufficient demand from the business sphere for knowledge and innovations held within universities then increasing the supply will not

lead to wider economic growth. In the case of the Technium there is a question over the influence of Structural Funds in the location decisions, as noted by a business representative interviewed; centres were built in parts of Wales that receive Convergence funding rather than in the most appropriate places where there was a proven need.

An interesting criticism is raised by one respondent over the fact that the Techniums were not connected into the wider innovation system:

Shiny buildings where there is little capacity to use and exploit what the infrastructure provides, because there is either no demand, or little demand, it's been seen as the end in itself rather than the means. And not connecting with the innovation system. (University 10)

Some stakeholders questioned whether the Technium programme really was an innovation programme; it certainly is presented as such in the policy and the original rationale behind it fits the Triple Helix approach to innovation, but the reality is that it was little more than a property programme.

I think to some extent they became a substitute for a property investment programme rather than an innovation programme. (Government 9)

They weren't all proper innovation centres. (Government 8)

There is an important lesson to be learned from the Technium programme about the disjoint between a programme's original design and motivation and how it is actually implemented.

As the respondents highlighted, the original idea behind the concept was not necessarily a bad one, but as the programme expanded over time the innovation elements were lost and the later centres were arguably placed in the wrong locations where there was not sufficient demand for the services offered. Simply duplicating an approach that has worked in one context will not necessarily produce results in another, as the Technium experience shows.

The programme should not be written off entirely, however, as the remaining Techniums in

Swansea, Cwmbran and St. Asaph look set to remain a part of the Welsh innovation infrastructure for the time being. A wider problem with supply side policies like this is that if enough firms do not utilise the service, they will become reduced to the status of “Cathedrals in the desert” (Cooke & Morgan, 1992 cited in Morgan 1997). Although the programme had a driving Triple Helix rationale, combining expertise from the university, government and business spheres in Wales, that connection and collaboration does not seem to have taken place and outside of the Swansea (and perhaps St. Asaph) Technium the linkages between the centres and universities are weak to nonexistent.

A4B and its Predecessors

A4B is one of the Welsh Government’s key current innovation programmes, which aims to “unlock the potential of Wales’ Higher and Further Education Institutions” through knowledge commercialisation activities and the exploitation of academic held IP. A4B is a substantial innovation investment, at £70m over six years supported by ERDF funding, but does not receive as much resource as the Technium programme has. It is also considerably smaller than the KTP investment discussed below, but KTP applies to the whole of the UK so the amount of funding for Welsh third mission activities is more in the case of A4B. Huggins & Kitagawa (2011), in their analysis of higher education policy in Wales explain the evolution of A4B out of numerous separate programmes addressing knowledge transfer and commercialisation; from 2008 knowledge-transfer and commercialisation policy was overhauled and repackaged under the A4B brand. A4B was advertised as bringing together the best elements of previous Triple Helix style programmes, in particular KEF (Knowledge Exploitation Fund), Know How Wales (KHW), Accelerate Clusters and CETICs (Centres of Excellence). Due to space restrictions we cannot discuss each of these predecessor

programmes here, and the focus is on A4B as the most current of the approaches and the latest iteration of university-business programmes supported by the Welsh Government.

Evaluation of these Triple Helix programmes was carried out by an independent task and finish group, which was set up to investigate publically funded commercialisation initiatives over the last decade, the findings of which were published in *Commercialisation in Wales* in 2007. It finds an absence of a clear strategy statement from the government expressing the expected outcomes of commercialisation activities, and that the outcomes of commercialisation activities have been diluted by too many programmes trying to meet multiple objectives rather than focusing on a single core outcome. In light of this, the Welsh Government's decision to gather these different but related programmes together under the A4B banner seems logical. A4B has specific targets, leading to relatively straightforward evaluation come the programme's end, such as helping at least 200 businesses to benefit from collaborating with universities, and helping to launch at least 60 new products and processes onto the market. A4B aims to achieve these targets through: auditing the IP held by academic institutions to pinpoint projects with the best potential for commercialisation; evaluating potential projects of strategic value to Wales; and filling the funding gap between basic early research and market exploitation. Because A4B is a relatively new programme, which has not run its course, it is not possible to comprehensively evaluate it at this stage. But Huggins & Kitagawa highlight how this new approach is capturing significant European finance for third mission activities thus providing the possibility of developing a system of sustained and coherent support, which was a major criticism recognised by the Welsh Government as missing from its previous interventions (2011).

On the basis of stakeholder interviews, A4B is viewed fairly positively by university and government actors, but was not mentioned by interviewees from the business sphere causing us to question its wider economic impact outside of the university sector. University

stakeholders involved in third mission activities highlighted the unique nature of A4B and the fact that it is filling a gap in the support infrastructure because it provides funding for smaller projects. A4B is a good example of the Welsh Government providing a service that meets the perceived needs of Welsh actors; although similar supports exist at the UK level (such as KTP), university stakeholders see the need for a programme that provides shorter term and smaller scale support.

The Welsh Government have responded to the opportunity of Structural Funds by setting up various opportunities such as A4B, you know. And that has provided very good interventions, what they've been very good at actually is providing things that fill the gap. Because often the UK things tend to be bigger and longer term, but they've filled the gap in where the opportunities really are. (University 3)

Although university respondents were generally supportive of the aims and rationale of the programme, some highlighted issues with the financing and design.

Lots of projects and programmes have productive starting points but are not followed through. E.g. of A4B suffering from a lack of long term funding (University 4)

These problems raised although in reference to A4B were echoed by respondents in reference to different programmes; issues of funding availability and programme design are cross cutting. There is a particular issue highlighted by respondents with regards to programmes with EU Structural Funding behind them because the report requirements are so stringent. This is seen as a barrier to taking part in the programmes because the costs of complying with the regulations are so high.

It is perhaps unsurprising that actors from the academic sphere are mostly positive about A4B because it is a means through which they can gain funding for third mission activities at a time when universities are facing profound funding issues. The A4B programme was not

mentioned at all by business stakeholders, either in a positive or negative light. This suggests that the programme is not having much of an impact on the business community, and is mainly providing an alternative source of funding for universities' activities. This may be valuable in itself, but does not fit with the programme's aims to bring academic and business closer together and encourage the commercialisation of research for the benefit of the Welsh economy. The A4B experience causes us to question the relevance of these Triple Helix university driven approaches, which are having little impact on the Welsh business sphere according to the business owners, managers, and representatives interviewed. The fact that business stakeholders did not mention these schemes suggests that they may not have such an important role in the wider innovation system beyond the university sphere. There is a question mark over the capacity and capability of the private sector in Wales to absorb the outputs of this university third mission activity, whether the demand actually exists in the Welsh economy.

KTP – Knowledge Transfer Partnerships

Generally, UK level innovation policy and programmes do not seem to have as much impact on the Welsh case as we might assume, and there was little discussion of UK level policy and programmes by stakeholders interviewed with the focus mainly on Welsh interventions. One area in which this is not the case is the Knowledge Transfer Partnerships programme (KTP) run by the Technology Strategy Board (TSB). At the UK level, the Technology Strategy Board (TSB) is the national innovation agency, which aims to accelerate economic growth by stimulating and supporting business innovation. The TSB covers the whole of the UK, and so works with the devolved governments. In 2009/2010 the TSB contributed £25 million to the KTP programme, with additional £10.4 million by public sector bodies and £97 million contributions by business participants. Welsh KTPs accounted for 7% of these UK projects,

which is slightly higher than we might expect based on population share, and the Welsh Government's financial contribution to the programme is £1.2m per annum (CMI, 2011, p.9). The purpose of the KTP is to form a relationship between partners in academia and industry so that the company partner has access to the transfer of knowledge, technology and skills from the academic institution. This is achieved through placing an "associate" (usually a graduate or postgraduate) into a business, and providing training for the business. The KTP programme is an important innovation support in Wales. The Welsh Government's chosen priority sectors fit closely with those of the TSB, and in fact the Welsh Government will support only projects that fit within its 9 priority areas in-line with the current sector based approach.

There have been a couple of evaluations conducted of the KTP programme. It was evaluated by Regeneris Consulting, commissioned by the TSB, and this review found that it "is a well-liked product which generates good levels of client satisfaction and impact among the businesses, academics and associates it supports" (Regeneris, 2010, p.i). The evaluation was not entirely positive, and it found certain areas where frustration was felt among the partners, which were detrimental to the efficiency of the whole programme, such as the complex and time consuming application process. The cost-per-job for the KTP programme was found to be about £56,000 to £61,500, which compares very favourably to the Technium programme, but it was found that greater returns could be made if the programme prioritised higher impact partnerships (ibid. p. iii). Another evaluation was conducted on the KTP programme in Wales by CMI. This evaluation portrays the KTP programme in a strongly positive light, and provides supporting evidence for this; however, we suggest that because only programme participants were interviewed for the study it overstates the positive reception amongst the business community. They found that the KTP Wales programme generates £5.85 additional GVA per £1 of public sector investment, and when Welsh Government investment alone is

considered this produces £13.12 of additional GVA per £1 invested (CMI, 2011, p.4). So, the KTP scheme does look like good value based on this analysis. They also find it to be highly popular amongst Welsh businesses, however the consultancy interviewed 37 companies who were already participating in the scheme, so the analysis says little about the business sphere as a whole. Whereas we sampled directly from the business sphere, rather from the small number of programme participants.

As with the other Triple Helix style programmes, the KTP is popular amongst the academic and government respondents but was not mentioned by business stakeholders. University respondents were especially positive about the programme:

Very big fan of KTPs, that's been great. (University2)

It is a good successful programme. (University 11)

In fact, there were no negative comments made about the KTP programme at all, which is unusual because even with generally well regarded programmes there are usually elements that stakeholders are critical of. However, as is the case with the A4B programme, the business stakeholders did not refer to the KTP programme at all. Only one reference was made to the university-industry programmes by a business stakeholder, and this was to explain that generally the business sector sees these programmes as irrelevant.

The fact that these “triple helix” style programmes do not feature on the agenda of the business representatives interviewed suggests that they are not making much impact on the business sphere in Wales. Conversely, they do seem to be highly valued by the universities and also well evaluated by external reviewers. This paper suggests that providing additional funding for universities activities, although arguably an important function, does not match the rationale behind these types of interventions which is to encourage economic growth through greater university-business interaction. If the business sphere is largely untouched by

the schemes, and does not consider them to be important then one half of this equation is missing. The businesses who do take part in the scheme seem to be benefitting, as the figures provided by CMI show (2011), but considering they only have 37 businesses involved across the whole of Wales their assertion that the programme is well regarded by the Welsh business sphere seems rather weak and generalised.

Conclusions

This paper has examined the evolution of innovation policy in Wales from the perspective of the Triple Helix theory of innovation, and summarised and evaluated the main programmes pursued in Wales that have followed this approach. The three sources of literature (both academic and “gray” literature), policy analysis, and stakeholder interviews have been triangulated to provide a comprehensive study of the Welsh Government’s innovation related activities. A number of conclusions emerge from this study, which are briefly summarised here and to be elaborated on in further published work. The first finding is that Triple Helix based approaches have been popular in Wales in the period following political devolution from the UK, featuring in the economic and education policies over the period, and three of the most important supports as defined by stakeholders in the innovation system follow this approach (namely KTPs, A4B and the Technium programme). Indeed, these have received substantial resources from the Welsh Government, the UK Government, and also the EU through Structural Funds. Because of the prominence of Triple Helix approaches in Wales it is important to analyse and evaluate them to judge whether they have represent good value for money and efforts - achieved in this paper through a qualitative study of key stakeholder’s opinions. We suggest that the popularity of Triple Helix programmes in Wales are partly due to strong interest in these ideas within policy spheres in the UK (Lambert Review, 2003; NESTA *‘The Connected University’*, 2009) and also because of the relative simplicity and

accessibility of the theoretical approach; policy makers in Wales had a good appreciation of the concept.

Triple Helix programmes have received mixed reviews from the Welsh stakeholders; the Technium programme is generally seen as having been unsuccessful, whereas the A4B (and its predecessors) and KTP programmes are well-regarded by respondents from the academic and government spheres but less so by the business stakeholders. This causes us to question whether these programmes are having the wider impact on the Welsh economy if they are not especially high on the business sphere's agenda. We suggest that their popularity amongst university stakeholders is due more to the fact that universities in Wales are facing increasing financial difficulties and so are keen to exploit any avenues available for additional income such as supports for commercialisation, collaboration, and technology transfer. There appears to be a mismatch between the supply of university knowledge and innovation, and the demand from the business sphere in Wales.

The Welsh Technium experience highlights the importance of matching up supply and demand when designing innovation programmes, with a weak business sphere often unable or unwilling to utilise supports even if they become available. Conversely, the continuation of the four remaining centres suggests that where there is a pre-existing business and university demand then the incubator approach can work. The Technium experience highlights the importance of addressing the softer aspects of innovation; providing physical infrastructure alone may not stimulate innovation in the private sector if the networking and collaboration (or "softer infrastructure") elements are lacking.

This paper supports the assertion made by Huggins et. al. (2008) that universities in Wales are expected to perform a leading role in driving the innovation and economic development agenda. We have shown that Welsh innovation and related policy has a strong Triple Helix

thread running throughout, and views universities in Wales as important economic drivers. This policy rhetoric is supported by important programmes to encourage innovation through the Triple Helix approach. We suggest that this focus on universities in Wales, and the large amount of resources devoted to Triple Helix programmes as the major Welsh innovation supports, has been at the expense of nurturing the demand side (i.e. an innovative business sphere).

According to the Triple Helix model the three spheres of university, business and government are all required to work together to drive innovation, and the model might not work if one of these three helices is too weak, or the links between them are lacking. We suggest that in Wales the government is relying heavily on universities in Wales to drive its innovation agenda and may not be addressing the “demand side” issues of the absorptive capacity and capabilities of businesses. In Triple Helix terms we suggest stronger government and university spheres relative to the business sphere, and weak linkages between the university and business spheres in particular because of this imbalance leading to a mismatch between the supply and demand for university held knowledge.

For weaker regions we suggest that the Triple Helix approach could be problematic if it encourages governments to focus too many of their (limited) resources on universities at the expense of developing the absorptive capacity and innovative capabilities of the business sphere. The Triple Helix theory focuses on the interaction and combination of the three spheres of university-industry-business, but we argue that in Wales it has been interpreted with a stronger focus on the university sphere relative to the business sphere. This paper does not infer the failure of the Triple Helix approach in weaker regions, but raises questions over the way it has been interpreted and implemented. The Welsh Government has grasped the university-driven aspects of the approach, but has not focussed equal attention on the business side. We suggest that the theory itself does not provide strong enough suggestions to

policy makers regarding strengthening the business sphere compared to the focus on the university helix. Furthermore, it provides an ideal type model that could be difficult, if not impossible, for governments in weaker regions to attain. This case study has highlighted some of the limitations of the theory in policy terms: it leaves governments with few tangible suggestions of how to strengthen the business sphere, but plenty regarding the university sphere leading to an over focussing on this one helix.

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