

## ARTICLE

## OPEN ACCESS

## Policy path dependency in a less developed region: The evolution of regional innovation policy in Wales (UK)

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### Abstract

The paper examines the concept of path dependency in policies, and seeks to examine how different pathways emerge in policy and how these change over time. It does so with reference to a case study of regional innovation policy development in Wales (UK) over a period of more than thirty years. Building on recent developments in regional studies and economic geography the paper considers whether path dependency is an inevitable feature of the policy process at the regional level. Drawing on documentary analysis and interviews with policy makers, it finds that policy decisions taken early on in the path creation phase (to support technological innovation) endure despite attempts to broaden out the pathway to a more inclusive form of innovation policy in Wales. While path dependency, most evident in core technological and R&D policy instruments, hasn't prevented path experimentation, the findings suggest that rigidity and renewal co-exist in policies and the policy process for regional innovation over time. The findings contribute towards the growing focus on the temporal dynamics of policy change at the regional level and the complexity of policy as it seeks to address the challenge of innovation in less developed regions.

### Keywords

Regional innovation policy / Path dependency / Institutional change / Time / Less developed regions.

## Dependencia da traxectoria política nunha rexión menos desenvolvida: a evolución da política de innovación rexional en Gales (Reino Unido)

### Resumo

O artigo analiza o concepto de dependencia da traxectoria nas políticas e pretende examinar como xorden diferentes traxectorias na política e como estas cambian co tempo. Faino con referencia a un estudo de caso do desenvolvemento de políticas rexionais de innovación en Gales (Reino Unido), durante un período de máis de trinta anos. A partir dos desenvolvementos recentes nos estudos rexionais e da xeografía económica, o artigo apunta que a dependencia de traxectorias (path dependency) é unha característica inevitable do proceso de política a nivel rexional. A partir de análises documentais e entrevistas cos responsables políticos, descobre que as decisións políticas tomadas no inicio da fase de creación dunha traxectoria (para apoiar a innovación tecnolóxica) son determinantes, a pesar dos intentos de ampliar a senda cara a unha forma máis inclusiva de política de innovación en Gales. Aínda que a dependencia de traxectoria, máis evidente nos instrumentos básicos de política tecnolóxica e de I+D, non impediu a experimentación de novas vías, os resultados suxiren que a rixidez e a renovación coexisten nas políticas e no proceso de política para a innovación rexional ao longo do tempo. Os achados contribúen ao crecente interese na dinámica temporal do cambio de políticas a nivel rexional e na complexidade das políticas, particularmente nas rexións menos desenvolvidas.

### Palabras clave

Política rexional de innovación / Dependencia da traxectoria / Cambio institucional / Tempo / Rexións menos desenvolvidas.

**Códigos JEL:** O30, O38, P48, R10, R58.

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## 1. Introduction

This paper examines the complexity and challenges faced by less developed regions in designing, sustaining and adapting innovation policy over time. Less developed regions are widely recognised as lacking in many of the assets that underpin innovation in leading regions such as high levels of R&D and growth activity in the private sector. Using recent findings on path dependency from the economic geography and policy studies literatures the paper examines how new regional policy pathways are created, evolve over time, and whether rigidity is inevitable. It does so by adopting a temporal perspective, and applies this conceptual framework to innovation policy in Wales, a devolved region of the UK. Wales has long underperformed on key measures of economic prosperity such as Gross Value Added (GVA) (Streeck & Thelen, 2005). Wales also has one of the longest histories of seeking to address these problems through state intervention. This includes more than thirty years of regional innovation policy activity, designed to develop a new regional pathway beyond its traditional heavy industries and low added value sectors.

The concept of path dependency is a topic of growing interest amongst researchers in a wide range of subject disciplines. Inspired by the early work of Paul David (1985) and Brian Arthur (1994) on the path dependency associated with new technologies, authors such as Ron Martin have begun to develop the concept further and explore its geographical implications for economic development (Martin, 2010; Martin & Sunley, 2006). This recent work, informed by evolutionary theory, has challenged the notion that 'lock-in' (Grabher, 1993) is an inevitable outcome for regions, with limited potential to escape (Strambach & Halkier, 2013). Instead, Martin (2010) calls for path dependent processes to be studied alongside path creation and path destruction, as processes that characterise and shape the evolution of areas and industries over time. Such path dependent processes are similarly studied by policy theorists, where it is argued that policy 'stickiness' (Kay, 2008) is a characteristic of policy over time. Indeed, policy theorists have put forward influential concepts to explain slow change and rigidification of institutional processes through layering/delaying, conversion and drift (Streeck & Thelen, 2005).

Yet despite the growing interest in the path dependency concept, studies of innovation policy genesis and path development are few and far between (See Valdaliso, Magro, Navarro, Aranguren & Wilson, 2014). Indeed, the temporal aspect of regional policy, more generally, tends to be underdeveloped in innovation studies (Flanagan, Uyerra & Laranja, 2011). The aim of this paper is to address this gap through the analysis of the contextual factors and mechanisms underpinning policy path development and change in the region of Wales. It does so by drawing on documentary analysis and interviews to identify the evolution of innovation policy path development in Wales over a thirty-year period.

The structure of the paper is as follows. The first section sets out the conceptual framework for the research, drawing on regional path dependency perspectives from economic geography and political studies. It then sets out the methodology employed in the research. The results of the research are presented in analysis of path dependency and regional innovation policy in Wales. This is followed by analysis and final conclusions.

## 2. Path dependence and innovation policy in less developed regions

The concept of path dependence was developed by economists to explain how particular technologies were able to gain an initial advantage, which subsequently locked them in to a particular mode of innovation (Arthur, 1994; David, 1985). Examples such as the QWERTY keyboard and the Betamax/VHS video player have been put forward to illustrate how chance events can lead to lock-in of technology and processes which prevents other entrants. Such models stress the importance of initial chance events, alongside self-reinforcement mechanisms and increasing returns. The early work

of Arthur (1994, p. 112), for example, identifies a range of positive returns that shape technologies and their social context:

- Large set-up or fixed costs – creating incentives to identify and stick with particular options.
- Learning effects – knowledge acquired from complex development work can spur further innovation and exploitation in this and related areas.
- Coordination effects – where benefits received increases others to adopt as well as the development of linked infrastructure, making the technology attractive.
- Adaptive expectations – where projections about the future success of a technology encourage individuals to adapt action to make come true.

In recent years the concept of path dependence has gained popularity across a range of disciplines. In economic geography the work of authors such as Martin and Sunley (Martin, 2010; Martin & Sunley, 2006) and others have proposed an evolutionary approach which allows for path creation, dependency and decline in particular places, as well as a critical interpretation of the concept of lock-in. This body of work challenges neo-classical economics' foundations in equilibria and rationale choice, and points towards the importance of context constraining and enabling both stability and / or change over time. In this respect path dependency is seen as having both positive and negative features for technologies and regions, helping them to exploit specialisation advantages from particular pathways (Martin, 2010). Equally, regions may become locked into particular sectors and technologies that make it difficult to escape once the initial foundations of success are no longer pertinent. Grabher's (1993) study of the Rhur region provides an example of how functional, political and cognitive lock-in can make it difficult for the region to exit.

Martin (2010) has argued that the concept of path dependency and lock-in in regional economies reflects their status as complex, multi-faceted realities. Yet, while recognising factors for inertia the emerging evolutionary approaches to path dependency emphasise that it is a process that in addition to development along a particular pathway, also has the potential for 'off path experimentation' and recombination of forms of knowledge (Schneiberg, 2007).

The works of Martin (2010), Martin & Sunley (2006), Flanagan & Uyarra (2016) and others draw insight from political science and sociology – disciplines that have similarly adopted the concept of path dependence to explore the processes of inertia and change in government policies. While the main focus has been on path dependency in whole systems (North, 1990) policy theorists have begun to apply path dependency to policies (Kay, 2005).

Hall (1993, p. 278), for example, identifies three central variables of policy in the system, including the 'overarching goals guiding policy', 'the techniques or policy instruments used' and the precise setting of these goals'. Path dependence it has been argued, can be a feature of policy systems as a whole but also in sub-systems. In his study of the role of time in public policy Kay (2005, pp. 562-563) points to the accumulation of policies over time in a range of policy areas, which makes them difficult to change. This he argues is reflected in 'stickiness' which results from factors such as increasing returns, including where a policy area restrains one group but not others, policies that reduce government capacity, such as administrative, constraining future policy options, policies that lead to informal contacts with individuals which are difficult to change.

Elsewhere, Pierson (2004) maintains that political institutions are inherently rigid, with a tendency towards 'status quo bias', in contrast with the economic sector. Indeed, he argues that those who design policies will often do so to ensure that they cannot be overturned by successor, and that institutions will seek to reduce uncertainty and instability to 'facilitate cooperation and change' (p. 43).

Path dependency research from evolutionary and policy theorists has tended to allow for 'in path changes'. Such changes, while small, allow the framework to capture dynamism within pathways, without significant disruption (Strambach & Halkier, 2013). This contrasts with the 'punctuated

equilibria' argument underpinning the work of David (1985) and policy theorists such as Baumgartner & Jones (1993). Institutional candidates for evolutionary change within rigid contexts identified by Streeck & Thelen (2005) include:

- Displacement: This is said to occur where new models emerge and diffuse. This is said to happen when traditional arrangements are discredited or pushed aside in favour of new institutions and intervention logics (p. 20).
- Layering: This refers to the addition of new micro-components to an institution or policy institution that already exists. This can lead to so-called 'differential growth' in which previously important components become dominant at the expense of others (p. 22).
- Conversion: This occurs when the purpose of existing institutional component is changed. Such changes can occur due to external pressures, resulting in policy makers utilising existing institutions for new purposes (p. 26).
- Drift: This is the process of stasis that results from the lack of active maintenance, for example, refocusing or renegotiating rules in response to changes in the economic and political environment. Indeed slippage with a 'real world' context can lead to 'erosion or atrophy' (p. 24).

These mechanisms are said to operate alongside factors such as increasing returns in helping to prevent institutions from becoming locked-in. Such ideas point towards the concept of development paths operating at different levels. Indeed for some policy theorists this is likely to mean that while policy may follow particular paths, change within the sub-system may be the norm (Pollitt, 2008) p. 49. This has echoes of Strambach & Halkier's (2013, p. 2) term - 'path plasticity' which, they claim, enables 'innovation with a minor degree of complementarity within the well-established institutional setting of paths may come into being'.

At the regional level there have been several studies identifying path dependency exploring its role in helping to sustain or create new pathways (Hassink, 2009; Hudson, 2005), the policy process has rarely been treated as having path dependent properties that can operate at different levels (Valdaliso et al., 2014). That is, few studies have sought to understand how path dependency in the policy-making process occurs over time, and how it has multi-level characteristics. To address this, the paper addresses two research questions (1) What are the factors that drive different policy pathways over time? and (2) Is path dependency an inevitable outcome of these policy pathways?

### 3. The research case and methodological approach

The paper follows a case-study methodology, with a study of innovation policy evolution in Wales (UK) over a period of more than thirty-years. Wales is one of Europe's less developed regions, and in recent years has been a recipient of the highest level of EU structural funding. This reflects its ongoing underlying development challenges facing the regional economy. It is further characterised by a persistent gap in prosperity in terms of GVA per capita with other UK and European regions.

The Welsh economy, traditionally dominated by coal and steel, has given way to one characterised by a high degree of services activity. Much of Wales' current population of 3.11 million, and regional economic activity, is centred in the southern coastal belt cities such as Cardiff, Swansea and Newport, and the South Wales Valleys. A smaller concentration can be found in the North East, while Mid Wales and North West Wales have a largely rural character, with agriculture and small market towns.

For most of the past thirty years, the main sources of evidence for regional innovation has been derived from economic indicators such as GVA, job creation, unemployment, and R&D-related expenditure. Figure 1 below illustrates the evolution of business R&D expenditure in Wales as a proportion of GVA, and shows that despite growing over the period, Wales has been consistently at the bottom end of the UK 'league table', and some way behind England and Northern Ireland. This reflects

the limited R&D business base in Wales and the lack of high productivity sectors (Thomas & Henderson, 2016).

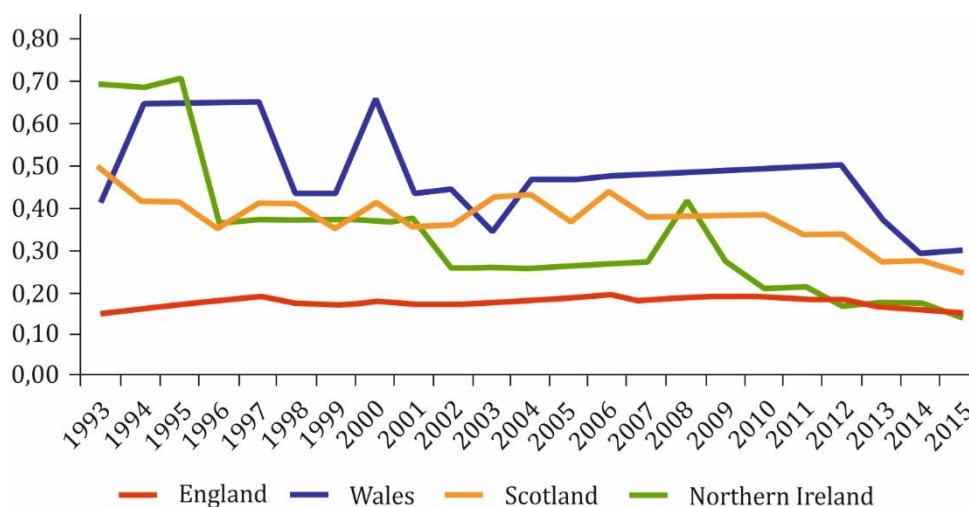


Figure 1. Business expenditure on R&D as a % of GVA. Note: GVA (income approach) at current basic prices. Sources: Office for National Statistics (ONS, 2016a, 2016b).

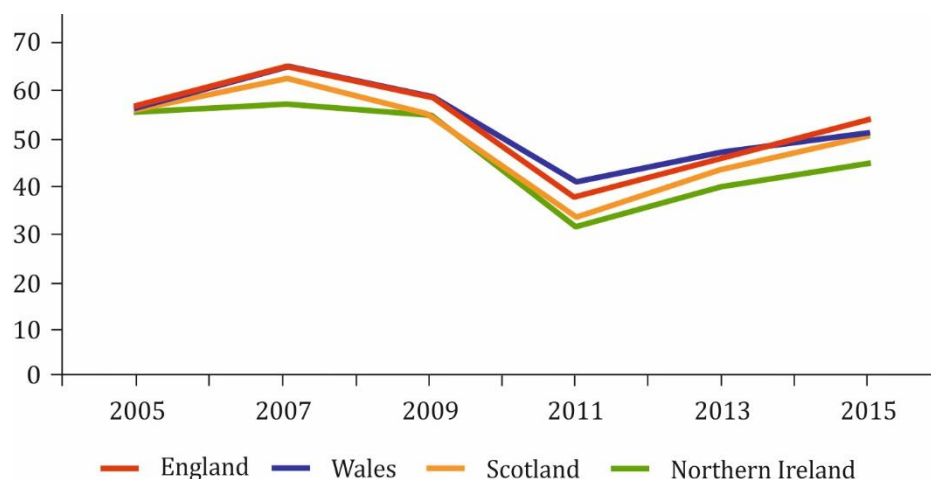


Figure 2. Innovative active firms (% of respondents). Sources: Department for Innovation Universities and Skills (2008); Department of Enterprise, Trade and Investment (2006); Department for Business Energy & Industrial Strategy (2017); Author's own calculations.

Additional data on performance can be found in the Community Innovation Survey, which illustrates innovation activity, of a far broader nature than R&D. This indicates that Welsh firms have one of the highest proportions of innovation active firms over a 10-year period, despite the common dip in activity in the period to 2011, and subsequent recovery. This mixed evidence implies that while Wales may not have developed as an R&D intensive region in recent decades, its firms may be innovating through softer, less technical, forms of innovation activity.

Over the period under review, improving Wales' GVA has been a fundamental concern of the Welsh Government and its predecessors. As figure 3 below indicates, Wales has continued to lag significantly behind, at just over 70% of the UK average, despite the publicised targets to close the gap (Welsh Assembly Government [WAG], 2002a).



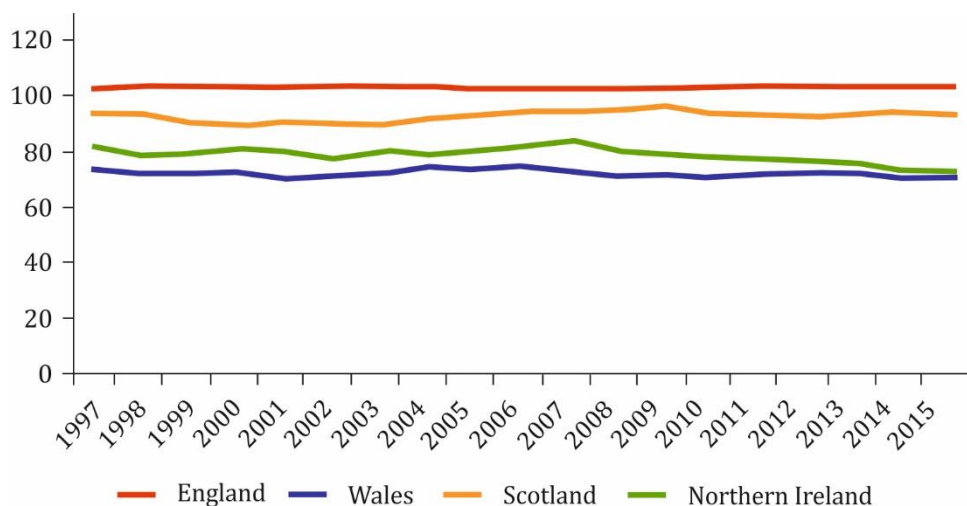


Figure 3. Gross Value Added per head indices. Notes: UK = 100. Source: ONS (2016b).

The period of research coincided with the launch of Wales' first steps in the creation of innovation policy, through to its recent introduction of the Smart Specialisation agenda. It follows a Structured Policy narrative approach (Roe, 1994). This method seeks to explore the dynamic policy development over time, by giving focus to the mechanisms, and making sense of the sequence of events over time (Kay, 2006).

The research utilises three main data sources: secondary analysis of policy documents; interviews with the innovation policy community in Wales; and analysis of news sources. Policy documentation was sourced from a literature review of websites and from government interviewees, and included policy statements, operational plans and consultation responses. The fieldwork for the case study included interviews with representatives of the multi-levels of governance in Wales, including current and former government officers, business representative bodies, universities and businesses (large and small). These interviewees were selected using a 'snowball sampling' technique, with the focus on securing perspectives from the policy community over the period of research. A total of 12 interviews were completed between July 2017 and February 2018.

#### 4. Policy adaptation and change: 30+ years of innovation policy in Wales

The Welsh economy has long faced challenges associated with the legacy of its traditional industrial heritage in coal and steel. In this respect, Wales has adopted a strongly interventionist approach to economic development based on the preeminent role of the state. This approach has resulted from the comparatively weak private sector in Wales, characterised by low wage/skills and insufficient high growth businesses and sectors (Morgan, 2016). Innovation policy has increasingly formed part of the policy mix introduced to redress these structural challenges. The following section explores the evolution of these innovation policies using the path dependency framework outline above.

##### 4.1. Laying the path foundations - technology policy (1984-1990)

The origins of innovation policy in Wales lie in the decline of its heavy industries in the 1970s and 1980s, and the desire of policy makers to ameliorate its effects. This impetus saw a campaign for the creation of a regional development agency (Morgan, 2013), and the subsequent launch of the Welsh Development Agency (WDA) in 1977. The initial remit of creating new economic activity and jobs was

later supplemented as new objectives emerged. Technology support was one such addition to this remit, as the WDA sought to expand its support for SMEs and introduce new, higher value, sectoral activity in Wales (WDA, 1985). The rationale for intervention was set out in an expert report to the WDA:

Technological development has a central role to play in improving the competitiveness of Welsh industry and ensuring economic growth and secure job opportunities for the future... Companies will have to exploit new technologies with drive and efficiency, but they will also need fully to use external help... [Moreover] Available Welsh resources, chiefly in the HEIs, are diffuse and intended primarily for teaching and research rather than to serve the needs of industry. At the same time the very proliferation of national schemes tends to reduce the ability of small and medium-size companies to make use of such financial and other support' (Deloitte Haskins & Sells, 1983, p. 12).

This report recognised, for the first time in Wales, the potential role of universities and government agencies in supporting business innovation, but also the challenges of engaging universities in business support. This rationale represented a significant departure for the WDA, which until then had largely been focused on land reclamation, factory building and inward investment (Morgan & Henderson, 1997). It also reflected the belief that Wales could not rely, purely, on central government instruments to support business innovation.

The WDA launched WINtech (Wales Innovation and Technology), as one of its departments, in 1984. WINtech was created to provide advice and support for technology-based firms in Wales. Its objectives were to 'market technology support programmes, foster closer links to the Welsh higher education sector, and to act as a financial and technical broker to small and medium-sized firm' (Morgan, 1985, p. 40). WINtech adopted a strong technology focus, including support for R&D projects, technology awareness raising, industrial brokers, and information on grants and technology support available from schemes run by the UK Department for Trade and Industry (DTI) and the European Commission (WDA, 1987). These policy instruments were increasingly complemented by hard infrastructure such as technology centres and innovation-focussed incubators across Wales, including accreditation of university 'Centres of Excellence' with a strong industry focus (WDA

The origin of WINtech was, in part informed by the work of external experts. This drew on the activities of other regions such as Massachusetts and Cambridge (UK), as well as existing policy instruments and concepts such as the emerging 'technology broker' networks being established across Europe at the time (Commission of the European Communities, 1982). It was this accumulation of policy instruments and responsibilities, however, that was responsible for its ultimate demise, with Cooke & Morgan (2000, p. 59) citing its weakness as 'having fingers in too many pies'. Moreover, despite its demise many of the technological and R&D instruments established during this period were subsequently continued into the next period.

#### **4.2. Broadening out the pathway – establishing innovation policy in Wales (1990-2000)**

The beginning of the 1990s saw the WDA restructure its activities, with the integration of many former WINtech activities into an enlarged business services division (WDA, 1988). These changes formed part of the WDA's attempts to develop a more 'professional' approach to its business support activities.<sup>2</sup> Within this new division, senior managers sought to introduce policy instruments to respond to this agenda, with a greater focus on larger companies with growth potential<sup>3</sup>.

<sup>2</sup> Author interview with senior manager of the WDA Business Services Division, October 24<sup>th</sup> 2016.

<sup>3</sup> Author interview with senior manager of the WDA Business Services Division, September 28<sup>th</sup> 2016.

In addition to trial and error policy developments, expert input from academics was equally evident, with academic concepts such as interactive learning and systems of innovation beginning to inform policy discourse.<sup>4</sup> Indeed, such concepts were central to Wales' involvement as a pilot region of the European Commission's Regional Innovation Strategies (RIS) programme in the middle of the decade (Henderson, 2000; Morgan, 1997). The pilot RIS programme in Wales, named the Regional Technology Plan (RTP), was launched in 1994, and saw the creation of a Steering Group comprising members from government, development agencies, business, higher and further education, local authorities, and trade unions (WDA, 1996b). This group oversaw what was one of the most extensive consultation exercises undertaken in Wales, and provided a focal point to an interactive learning exercise around the future development of innovation and policy in Wales (Henderson & Thomas, 1999). This exercise, alone, was said to have underpinned the launch of some 50 new innovation policy instruments in Wales (WDA, 1998). Indeed, the success of the RTP subsequently inspired similar interactive strategy exercises in areas such as entrepreneurship policy (Huggins & Pugh, 2015; Jones-Evans, 2007).

The policy and instruments established during this period were central to building a broader conception of innovation, beyond pure technological innovation. This broadening out of innovation policy brought additional actors into innovation policy support, and a greater emphasis on companies learning from each other (WDA, 1996a). The success of this was evidenced by policy makers sustaining interactive discourse beyond the immediate lifetime of the initial RTP funding (WDA, 1998). To this end, this period helped to strengthen a coalition of interests behind innovation policy to Wales, and embed innovation in policy discourse in a way that WINtech had been unable to. Equally important was the success of these policy processes in providing a framework for subsequent European funding periods. Indeed, without access to such funding, it would have been difficult to identify any funding internally, with the consequent danger one of innovation becoming marginalised against the preeminent priorities of inward investment and land reclamation (Henderson & Thomas, 1999).

#### **4.3. Institutional change and consolidation of innovation policies (circa 1999-2010)**

From the late 1990s onwards the institutional landscape underpinning regional innovation policy in Wales was substantially altered. The first such development was devolution and the subsequent creation of the National Assembly for Wales. It was the redrawing of the European regional boundaries in Wales, resulting in the newly defined 'West Wales and the Valleys', however, that had the most immediate impact on regional innovation policy with the arrival of the larger Objective 1 Operational Programme.

Within this context a number of novel policy instruments began to emerge: the reestablishment of property as a feature of innovation policy, through the Technium network, the merger of innovation and entrepreneurship in the Knowledge Exploitation Scheme, and the growing importance of science priorities in policy statements. Aside from the publication of Wales for Innovation in 2002/03, however, innovation did not see any dedicated policy communications for more than 10 years subsequently. These developments are considered in turn below.

The early property features of the innovation pathway re-emerged in the early to mid-2000s. Given impetus by the arrival of objective 1 and the perceived success of the original Technium development in Swansea, a network of Technium centres were rolled out to much of the West Wales and the Valleys area. The ingredients of the Technium followed a common format with an aspirational 'statement' incubation building part-funded by ERDF Objective 1 money, targeting sector/technology or geographical area, and supported with the aid of local partners – some of which were universities, local authorities and other groups. The Technium experiment has been analysed in a range of consultancy studies and academic papers. The key conclusion was that

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<sup>4</sup> As above.



with the exception of the first Technium there was a lack of any sort of business planning (Morgan, 2016). In this respect the initiative failed to learn the lessons of early policy periods, in which the RTP called for innovation centres that crucially were aligned to local innovation needs and support (Cooke, 2004).

The second major development was the further layering of innovation support instruments alongside entrepreneurship supports. This direction emerged from the RTP priorities and its focus on establishing an innovation culture. It was expressed in the launch of an Entrepreneurship Action Plan (Jones-Evans, 2007) and instruments such as the Knowledge Exploitation Fund (KEF). KEF was launched in 2000 as a collaborative venture supported by then then Education and Learning Wales (ELWa). The premise of the Fund was that innovation skills and enterprise lie at the heart of building an innovation culture in Wales. Working alongside the WDA, in many cases the KEF programme funded a number of different instruments such as Entrepreneurship Champions in HE and FE institutions, grant funding for innovative graduate businesses (so-called KEF Scholars), networks and skills development.

A further branching in the policy pathway emerged in the innovation policy vacuum created by the demise of the WDA and its absorption into the WDA in 2006. This saw responsibility (and staffing capacity) for innovation and other economic development functions merged into the Welsh Assembly Government. Amongst the changes introduced in the wake of the merger was the creation of a Chief Scientific Advisor post within Welsh Assembly Government. This resulted in the launch of a new Science Strategy for Wales (Welsh Government, 2012). This document established a series of science 'priority areas' that have endured throughout the remaining decade and beyond. New science policy instruments created were focused on building scientific excellence in Wales higher education base (a focus last seen in the path development activities of WINtech).

Explicit innovation policy, however, was largely absent in this period, with the only national innovation statement produced in 2002 (WAG, 2002b). The inclusion priorities established for Structural Fund purposes did, however, enable some continuation of the primary innovation support instruments of the WDA through the ongoing prioritisation of technology and R&D objectives in policy frameworks for ERDF. A notable aspect of innovation support instruments in this period was extensive layering of previously separate instruments. This, in part was driven, by experiences of the Objective 1 programme 2000-2006 in which a large number of separate projects were established, making the administration a complex challenge.

In addition to administrative efficiency and strategic activity, this layering was further driven by the broader government agenda (evident across the UK) of business support simplification (DTI, 2007). It sought to address the perceived proliferation of instruments across government, with the aim of simplifying the interface for businesses. Within the new integrated framework, however, the Welsh Government's also engaged in so-called 'differential growth' of policy instruments, with emphasis increasingly placed on supporting collaborative research projects, at the expense of particular centres of expertise for industry. This represented a significant change in policy direction, as such 'centres of expertise' had been part of Wales' innovation policy pathway since its foundations in WINtech, and closely linked to the inward investment activities of the former WDA.

In parallel to the layering and simplification of innovation support instruments of the Welsh Government policy experimentation began to occur outside of the Welsh Government. This saw the continued growth of the importance of universities as leading partners on a range of new R&D mechanisms designed to foster knowledge transfer (notable examples include ASTUTE/ASTUTE 2020, WISE Network).

This trend was identified by Jones-Evans & Bristow (2010) and continued into the subsequent phases, with the aid of Convergence Structural Funds. Thomas (2013) has highlighted this trend as one of the major characteristics of regional innovation policy in Wales, representing it as a victory of the 'supply-side' measures. This contrasts with the objectives of the RTP (Morgan & Nauwelaers, 1999, p. xvi), which sought a 'more judicious balance between supply and demand side'.

#### 4.4. Prioritisation-based innovation policy in Wales (circa 2009-2017)

Key trends established in earlier periods were continued in this stage including the further simplification and layering, have continued in recent years. Alongside this high profile experimentation in the policy pathway has been evident. This was given expression in publication of the Enterprise Renewal Plan (Welsh Government, 2010) – a document that followed extensive consultation with the business sector. The strategy was underpinned by the proposition that all Welsh Government grant funding would only be available on a ‘repayable grant’ basis, and that its departmental structure for business– the ‘Department for Enterprise, Innovation and Networks’ - was to be structured according to newly established sector priorities. Despite early concerns ‘Innovation and Technology’ department survived in this structure as a horizontal department within the new structure. While these changes were the result of Welsh Government seeking to better adapt its policies to the needs of business, the implications of the changes were to cause significant inertia and delay in the availability of core mechanisms such as the SMART Cymru RD&I grant funding programme for business. Indeed, the Innovation and Technology department of Welsh Government were unable to process grant applications for this programme for just over one year (CM International & The Innovation Partnership, 2014).

The trend towards prioritisation was given further impetus in Wales, with the launch of the SMART Specialisation process (SS3). This process, again, adopted a consultative strategy building process, designed to represent the entrepreneurial process of discovery highlighted in European Commission guidance. The outcome of this process was an Action Plan – Innovation Wales (Welsh Government, 2013), launched in 2013. This exercise had similar objectives to the RTP, in the sense that it was intended to underpin priorities for research, development and innovation. The focus on prioritisation was, to a certain extent, evident in the earlier Science for Wales (Welsh Government, 2006). Indeed, it has been argued that Welsh Government failed to engage in a truly ‘entrepreneurial form of discovery’ and repackaging existing priority technologies establishing in Science for Wales and the Enterprise Renewal Plan (Pugh, 2014). Elsewhere, others have indicated that the broad nature of the priority areas established by Innovation Wales, and the lack of a specific action plan have not given innovation policy the same stimulus provided by the RTP in the 1990s.

The trend towards simplification through layering of existing instruments continued throughout the Structural and Investment Convergence funding period (2007-2013) through programmes such as A4B, SMARTCymru and Business Innovation. It has been subsequently given further impetus in the most recent iteration of Structural Funding period (2014-2020), with the early creation of the Welsh Government’s SMART ‘Suite’ of RD&I projects. This development is seeking to better integrate the previous instruments, by targeting the work of the Innovation Specialists (funded by the SMART Innovation programme, and previously part of the predecessor Business Innovation programme) to act as a gateway to Welsh Government and wider UK (e.g. Innovation UK grants) and European funding sources (e.g. R&D Framework programmes). This ‘Suite’ includes the new iterations of the earlier projects, under the new names of SMART Innovation (Business Innovation), SMART Cymru (same name) and SMART Expertise (A4B). These changes are said to have been brought about by both the learning derived from previous instruments, as well as the requirements for new Structural Fund projects to contain novelty.

These layering processes, while helping to consolidate innovation support initiatives, and aligning them to European funding rounds, have also contributed towards a two-speed pathway in Wales in which the core Welsh Government funding instruments have entered a period of relative stasis, alongside a more diversified series of instruments, typically available on a sub-regional and sectoral/technology basis and supported by activities such as the Ministerial Innovation Advisory Panel (launched in 2014). The continued presence of technological and R&D funding schemes for SMEs, many of which have not evolved significantly over the period considered, highlights the role of policy stickiness in policy pathways. This stickiness is one that has been supported by significant

interests such as large companies, but also universities – both of which have the capability to absorb such funds.

## 5. Analysis and conclusions

This paper has explored the evolution and development of regional innovation policy in Wales through the lens of policy path dependence. As one of Europe's less developed regions it has a long history of seeking to address economic development and innovation challenges through innovation. By examining policy evolution over a thirty plus period of time, using the framework of path dependence, the research explores the factors influencing path dependence, and the extent to which policy stickiness is an inevitable feature of regional innovation policy.

The findings of the research suggest that the path creation stage builds up through a series of small steps, which viewed over a thirty plus period contribute to continuity and change in regional innovation policies. The results show that the processes of path dependency has been most evident in Wales' continued support for technological and R&D initiatives over the past 30 years. This stickiness has been characterised by processes of layering, with core technology and R&D support initiatives gradually becoming consolidated into a small number of core support instruments for business and academia. Informed by decisions taken during the early part of the path creation period, this layering has resulted from the desire for administrative efficiency and the desire to simplify support to businesses.

The support of key actors from business, universities and government has helped to maintain the technological and R&D support agenda for regional innovation policy in Wales. Here the case study demonstrates the particular role of the university sector, in particular, in securing project funding to work with SMEs and improve infrastructure and commercialisation of new technologies (Jones-Evans & Bristow, 2010). Such influence has been reflected in the growing focus given to the science over the period, and the creation of new research infrastructure at university campuses across Wales. While some commentators have argued that the universities have begun to dominate funding for innovation in Wales (Thomas, 2013), this is largely a reflection of the weak nature of business R&D and knowledge absorptive capacity in Wales. It has, however, added additional dynamism to the innovation policy pathway in Wales.

In many respects the processes of consolidation in regional innovation policy in Wales have enabled policy makers to sustain innovation policy against the claims of competing policy agendas. This has been achieved in what has often been a challenging environment, where other parts of the UK scaled back regional innovation support (for example, the English Regional Development Agencies were abolished in 2012). The weakness of these path dependent process, however, has been the dominance of the technology and R&D elements of the innovation policy agenda, leaving comparatively little room for policy experimentation in the later phases. This has led to some concerns that businesses have become dependent on such funding (The Innovation Partnership & CM International, 2014). Further, while this process of rigidification of core instruments has not fully eliminated new policy thinking, experimentation this has seen the emergence of new policy ideas from outside (Smart Specialisation Strategies for example), but also initiatives such as the Innovation Advisory Panel. Funding constraints, however, have limited the scope for implementation of new policy ideas. This inability to implement alternative policy ideas and instruments is of particular concern in a less developed region like Wales, where there the majority of SMEs are unable to take advantage of technology and R&D focused initiatives.

The results from the case study suggest that path dependency of regional innovation policy, while not inevitable, can only be assessed by considering policy as a dynamic and complex process. Here, the results from the Wales case study suggest that regional policy for innovation in Wales has been characterised by the coexistence of varying degrees of rigidity and change over time. In this respect

the UK's decision to leave the EU in 2019, presents further complexity and challenges, particularly in a region like Wales, with its reliance on EU regional development funds. This challenging context suggests that Wales will need rethink its overall approach to innovation policy, and find new ways to finance and support its policy arrangements in the coming years.

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