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Policies for new path development: The case of Oxfordshire

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Abstract

This chapter reflects on how evolutionary economic geography (EEG) can be extended to incorporate public policy in its explanations of path development. A weakness of EEG is the poor conceptualisation of the role of the state (central, regional, local) in regional path development. It is therefore argued that a multi-scalar perspective of policy is required and that a large set of policies deserve attention. Oxfordshire in the UK is used to explore the link between public policy and path development.

1. Introduction

Recent progress made in evolutionary economic geography (EEG) has led to new insights into how regional economies develop over time and how new industrial growth paths emerge. A weakness of EEG is the poor conceptualisation of the state's (central, regional, local) role in regional path development (MacKinnon et al. 2009; Pike et al. 2009; Dawley et al. 2015; Pike et al. 2016). Advocates of the EEG perspective have thus far only offered some policy prescriptions that follow from their conceptual endeavours. We suggest that several other frameworks, notably regional innovation systems (RIS) (Cooke 1992; Coenen et al., 2016) and more recently the EU's smart specialization (S3) approach (Foray, 2015) could complement EEG in various ways, casting light on factors that are underplayed in the EEG framework. The RIS framework in particular has innovation policy embedded in its various formulations, although can be criticised for its neglect of entrepreneurship and enterprise policies (see Lawton Smith Chapter 12 this volume).

The aim of this chapter is to engage in discussions about how the EEG approach might incorporate public policy in its explanations of new path development. We advance the idea that a multi-scalar perspective of policy is required and that a larger set of policies (i.e. not only those that target firm spin-offs, labour mobility and regional networking) deserve attention. The challenge for regional/local policy makers is to capitalize on complementary and reinforcing policy processes at other levels and identify contradicting ones in regional policy making (Zukauskaitė, 2015). We argue that due attention should be given to agency of different actors (public and private), sometimes acting together and sometimes in parallel, bringing about sub-national industrial change. This raises issues of leverage through the capacity (or not)

both to resource activity and to bring about engagement of other parties (Lawton Smith, 2012), particularly in innovation-led economic development.

The multi-scalar policy environment comprises a complex range of co-existing policies operating at sub-national (local or regional depending on context), national and international levels. It includes policies targeted at the sub-national level, designed to deliver localised outcomes by local actors (for example the UK's Local Enterprise Partnerships (LEPs)). It includes policies on entrepreneurship, skills, infrastructure (roads, science parks, connectivity etc) and business support. It also includes non-spatial policies with spatial outcomes, for example extensive central government spending on research for instance in the fields of biotechnology, energy and defence that disproportionately benefits some regions rather than others.

In the empirical part, we draw on a series of studies on the growth of Oxfordshire's high-tech economy since the mid-1980s (for example Lawton Smith, 1990, Garnsey and Lawton Smith, 1998, Lawton Smith et al. 2012). These studies provide an historical perspective on local economic evolution in the context of national, regional and local policy agendas. While Oxfordshire is a special case having the advantages of a central location, a world-leading university and massive state investment in its science base, it is illustrative of issues of the ways policy intervention at various spatial levels demonstrably shapes local economic development.

2. How has evolutionary economic geography treated policy?

In essence, EEG "explains the spatial evolution of firms, industries, networks and cities and regions from elementary processes of entry, growth, decline and exit of

firms, and their locational behaviour” (Boschma and Frenken, 2011, 295).

Evolutionary theory is inherently tied up with notions such as interdependence among actors and the ways in which interdependencies and spillover effects create histories and render certain kinds of developments more likely to occur than others.

EEG highlights the importance and impact of historical preconditions on regional economic development (Boschma and Frenken, 2011, Martin and Sunley, 2006; Martin, 2012). New development paths are considered as being “rooted in the historical economic structure of a region” (Neffke et al. 2011, 261); they are portrayed as outcome of endogenous branching (related diversification) processes, by which existing firms and industries diversify into related fields. Such path branching processes are facilitated by “related variety”, i.e., the presence of different but technologically related industries (Boschma and Frenken, 2011).

Path branching represents only one form of path development, albeit a centrally important one. Other development routes such as new path creation (Martin and Sunley, 2006; Isaksen and Trippl, 2016), or what Boschma (2017) calls unrelated diversification (i.e., the rise of entirely new growth paths with weak or no linkages to the pre-existing industrial structure) also need to be taken into account.

Boschma (2007) distinguishes different mechanisms through which knowledge spills over from one local firm to the other, contributing to knowledge accumulation, regional growth and new path development. These are the spin-off process¹, labour

¹ One can distinguish between the spin-off model and the agglomeration model. The former suggests that the region grows firm by firm through spin-off dynamics. The spin-off process also includes firms formed by established firms as a process of internal diversification and university spin-offs. The latter implies that the more start-ups enter a region, the stronger the growth. In both cases firms tend to stay

mobility and social networking between (related) sectors. They work better in regions that already have stronger industrial bases (see Fritsch and Wyrwich 2014).

2.2 Policy and path development

Boschma (2009) outlined policy prescriptions to promote new growth paths by targeting the underlying mechanisms outlined above. He argues that policy should aim to connect complementary (that is, technologically related) sectors to exploit related variety. There is also scope for policy to help firms diversify into new sectors. Here we are interested in policy mechanisms and actions that promote these processes. We first briefly consider Boschma's prescriptions. We then expound a set of additional elements that need to be taken into consideration to understand the actual role of policy at various levels (multi-scalar perspective) in shaping new growth paths.

First, the spin-off dynamic is not just about quantitative change (Boschma, 2009). It is also about qualitative change through the provision of the conditions for entrepreneurship through various spin-off processes to emerge. This has a distinctive theoretical significance and would mean provision of public or private, support for new and early stage firms i.e. 'support region specific assets'. However, the timing of this is also conceptually and empirically important: at what stage is this recognised as a demand for policy intervention (Garnsey, 1998, Feldman et al. 2005)? Therefore at what stage do such interventions become part of new path development?

Second, labour mobility and skills are both local and non-local phenomena.

close to their home organisation, which can lead to new growth paths. As most spin-offs locate in the immediate surroundings of the parent organisation, the knowledge transfer mechanism contributes to localised knowledge formation as well as regional growth.

New employees bring new knowledge to firms through inter-firm mobility. This takes place largely at the local level but extra-local mobility (Breschi and Lissoni, 2009) also matters. Innovative places tend to have highly mobile populations (Lawton Smith and Waters, 2011). Where policy does often intervene is to encourage/allow inter-country mobility (for example Canada's entrepreneurship scheme) or to discourage it (see 2017 debates in the UK on migration following the Brexit vote). Developing skills needed for new path development provides a key role for policy and educational institutions in designing programmes that match local skill needs. Boschma (2009) states that there is little or no understanding of the types of labour needed by new industries when they emerge and develop. Nevertheless, countries such as Australia, the US and the UK have established policy frameworks for addressing such issues.

Third, Boschma and Frenken (2010) in their evolutionary perspective on the geography of innovation networks point to the proximity paradox – where stronger innovation performance does not necessarily arise from spatial proximity. This presents both a conceptual problem and a policy dilemma. Indeed, other authors have challenged the importance of local networking between firms as well as between firms and other organisations suggesting that non-local linkages are essentially important for innovation and new path development (Huggins and Prokop 2017, Trippel et al. 2017).

2.3 Towards a broader understanding of the role of policy in new path development

The role of policy in sub-national (local and regional) innovation-led economic development has been poorly conceptualized in EEG, when compared with other

approaches. In particular, EEG pays little attention to multi-scalarity in policy making thus neglecting the relative impact of national policies and institutions (for example the regulatory environment, the financial system etc.) on regional development and growth (see also Dawley et al. 2015). Here we begin by discussing regional innovation systems (RIS) (Cooke, 1992; Coenen et al., 2016) and the EU's smart specialization (S3) agenda (Foray, 2015) which we suggest are well equipped to complement the EEG perspective, and could lead to a better understanding of the role of policy in new path development.

The RIS approach suggests that regional development is driven by systemic innovation processes, requiring interaction between firms, research institutes and support organisations, which are embedded in the institutional structure of a region (Asheim and Gertler, 2005). RIS has served as an analytical focusing device helping scholars and policy makers to formulate and implement innovation policy that is sensitive to specific conditions found in a region (Tödtling and Trippel, 2005).

Smart specialization is specifically a policy concept, arguing for innovation-based development and growth in all types of regions (Foray, 2015). The main rationale behind smart specialisation is the identification of several priority policy areas, representing current strengths and future possibilities as well as the development of policy-mixes needed to support these areas. The areas are to be identified in a collective manner including regional policy makers, firms, universities and civil society representatives.

It is beyond the scope of this chapter to detail how these concepts have contributed to the development of innovation policy. We focus only on a few aspects that are particularly relevant in relation to new path development and the case under study.

In different conceptualizations of RIS, the region is understood as an open system interacting with national and global levels (Cooke, 2004; Asheim et al., 2011).

Similarly, awareness of processes taking place outside the region is also one of the central elements of smart specialization which argues for a stronger emphasis on external knowledge connections of regional economies (Radosevic and Stancova, 2015) and multi-level governance processes (European Commission, 2012).

While EEG recognises that institutions co-evolve with technologies and markets (Boschma and Frenken, 2011), its position regarding the possibilities for regional policy to bring institutional change and mobilize local leverage remains unclear. Boschma and Frenken (2009) suggest that supportive institutions come into being through state intervention after a new industry has been established. Boschma (2009) argues that there is a need for flexibility when it comes to institutions and organizations in the regions, so they can respond quickly to the needs of newly emerging industries. However, in some cases supportive institutions at national and regional levels are crucial preconditions for new paths to emerge rather than the other way around.

This is not to say that policy makers alone can identify future industry trends and the best ways to support them. Early studies on smart specialization practices suggest that by introducing collective governance practices, regional policy makers have

contributed to increasing the interest in regional matters of previously disinterested actors such as universities, SMEs and multinationals as well as increased legitimacy of policy intervention (Trippel et al., 2016). Thus, regional policy makers act as mobilizers of other actors and through a collective process support new path developments in the region.

The RIS literature provides an array of tools that regional policy makers can use in order to implement regional innovation strategies. They can target individual organizations/system components or the system as a whole (Nauwelaers and Wintjes, 2002; Isaksen et al., 2016). Funding as a direct investment by the government in funding concrete innovation projects, supporting collaborative efforts, providing public innovation procurement together with indirect efforts aiming at attracting investors and business angels to the region are among important tools for policy making. Due attention should be directed to government's own spending power. Where there are sub-national tax raising powers and retention of existing tax revenue (Perry and May 2007) regions have more options for new path development. For example this might relate to infrastructure projects through the establishment of business incubators, business innovation centres and science parks (Nauwelaers and Wintjes, 2002). While the evidence of the impact of such infrastructure is mixed, its absence can lead firms to relocate thus removing possibilities for new path development.

This suggests that, although the regional context might provide opportunities it also sets limits to the freedom for governments to pursue effective policy or for powerful special-interest organisations to take over an economy and slow down the capacity of

a region to adopt new technologies. The capacity for intervention designed to shape technological and innovation trajectories through a co-opted alignment of stakeholders at regional and international scales may be limited by resource availability.

3. The Oxfordshire Context

The key elements of the framework for the analysis of the Oxfordshire case illustrating the potential role of policy in evolutionary economic geography are spin-off dynamics, labour mobility and network formation (see section 2.1) together with the elements identified in section 2.2.

The analysis reveals the co-existence of multi-scalar policy processes in both economic development and in policy formulation and delivery in Oxfordshire over time. The multi-scalarity focus demonstrates how national policies might further reinforce, complement or contradict/oppose the efforts undertaken at the regional or local level. This is visible in outcomes such as sectoral composition, skills, and the composition of the science base as well as the propensity of universities to undertake ‘third stream’ activities related to local economic development.

3.1 The science base and the role of policy

Studies have shown that national spend on science, defence and education have uneven geographies of path development. The disproportionate regional effects of funding for scientific research can be seen in the science regions (Perry and May 2007) such as the ‘golden triangle’ in the UK (Oxford, Cambridge and London). In the case of premier universities such as Oxford and Cambridge, scientific research

always has a local or contextualised component. It contributes to the “glocalisation” of the region with universities becoming internationally recognised attraction poles for research and commercial activities² rather than because of systemic path dependent local engagement.

UK universities have been incentivized by science and technology policy, and later by regional policy agents, by successive governments. From sticks and exhortations in the 1980s and 1990s, to carrots (monies such as the Higher Education Innovation Fund, 1999) and from 1997 onwards more exhortations to be entrepreneurial for example through working with industry, activities including spinning off firms and patenting have become the norm (Lawton Smith and Bagchi-Sen, 2012).

Oxfordshire’s science base comprises nationally and internationally funded big science laboratories and private sector R&D laboratories and two universities, the University of Oxford and Oxford Brookes (Table 1). Their importance appears in several mechanisms for path development at different stages in the growth of the county’s high-tech economy.

Innovation-led path development through the spin-off process in the new sectors can in part be related to the impact of national funding of big-science, national government-funded research laboratories research in public sector laboratories such as nuclear energy and space dating back to the post WWII period (Lawton Smith, 1990). They were first established to service the UK’s nuclear energy programme (UK

Atomic Energy Authority, UKAEA, first nuclear fission and now only fusion

² Oxfordshire has recently attracted a £115m insulin research centre in collaboration with Novo Nordisk (<https://www.ft.com/content/8db89d84-e650-11e6-893c-082c54a7f539> (accessed March 9 2017))

research). Later they included space, environment and medical research. The laboratories are in two districts to the south of the county: the Vale of White Horse and South Oxfordshire (nuclear fusion laboratories).

Since the 1990s, the composition, its ownership and orientation have changed as successive governments introduced policies on the commercialisation of research. Later, in the 2000s land owned by the atomic energy authority was developed as a science campus. The Harwell site operates as the Harwell Science and Innovation Campus, one of the UK's two National Science and Innovation Campuses. It is a public-private partnership, and operates as a combined research and innovation park which in 2013 hosted 150 organisations and companies, employing over 4,500 people. The campus forms part of a sub-region to the south of the county which is known as 'Science Vale UK' and has become an important part of the county's high-tech infrastructure.

University science parks and incubators (both private and public) also form part of the county's high tech economy infrastructure, similarly supporting new path development. Both the Oxford Science Park (Magdalen College 1990) (a private sector partnership) and Oxford University's own Science Park at Begbroke established in 2000 have incubators. Begbroke combines space with outreach and entrepreneurship activities including the Centre for Innovation and Enterprise, the Enterprise Fellowship scheme and the development of new courses with the Department of Continuing Professional Development. National policies in science spending thereby further reinforce and complement such local processes.

Universities
Oxford University
Oxford Brookes University
Big Science
Harwell
RAL (Rutherford Appleton Laboratory) STFC materials and structures, light sources, astronomy and particle physics. <ul style="list-style-type: none"> - Space science - Diamond Light Source Facility (Synchrotron Radiation) - ISIS (physical and life sciences)
ESA UK Harwell Centre (space research) European Space Agency (ESA)
National Radiological Protection Board laboratory
Medical Research Council Radiation And Genome Stability Unit
Medical Research Council MRC Harwell (Mouse genetics)
NERC (National Environment Research Council) Centre for Ecology and Hydrology
UKAEA Culham (nuclear fusion)
JET (Joint European Torus) EU - European Fusion Development Agreement

Table 1 main elements in the Oxfordshire's science base

3.2 Industrial structure and the role of policy

Oxfordshire's high tech economy dates back to the mid-1980s. Its growth provides an example of entrepreneur-led new path creation and more recently of regional branching. No new sectors (both manufacturing and services) have their origins based directly in the county's older manufacturing sectors food manufacture, blankets and particularly in the post-war period, automobile manufacture (some 28,000 jobs were lost in the automobile industry in the 1970s). Now only the BMW Mini plant which employs some 4300 people and a number of component manufacturers and suppliers remain but does not interact with the high tech sectors of the city.

In 2010, the highest locational quotients (LQs) for high tech manufacturing are new industries: computing of various kinds, instrumentation and irradiation equipment.

Data show a close match of the service sector with both the manufacturing sector and the science base with specializations in computer related activity and scientific R&D.

Oxford University has directly contributed to new path development in the high technology economy through the spin-off process (Boshma 2009). It, rather than the firms, is responsible for a large number of spin-offs, many of which are located in the county, particularly in biotech and instrumentation.

The biopharma sector is one of the county's four main clusters. It is underpinned by massive state investment and by the mainly state funded demand side (the NHS). In 2011 OBN estimated that there were around 163 biotech firms in the county, up 14 per cent since the start of 2008. The majority were local start-ups or spin-offs (86 per cent). Only four were either new branches of larger companies or companies moving into the county. The trend has been for more start-ups and fewer relocations or new branches of larger companies. Although the cluster reflects high levels of research in Oxford University in biomedical science, most entrepreneurs in the sector have no connection with the university (Lawton Smith and Bagchi-Sen 2010).

The growth of a cluster of instrumentation firms has a long history in the county for example in irradiation, cryogenics and medical instrumentation dating back to the 1940s and 1950s. This has developed through both spin-off and agglomeration effects. They are strongly related to national public policy in the form of funding of research in the universities and national laboratories. The clustering has two elements: the connection between local firms and the science base and subsequent spin-offs from first generation firms, especially Oxford Instruments (Lawton Smith 1991).

Oxfordshire is now arguably the world capital of cryogenics, having pioneered

cryogenic-enabled developments like MRI scanners, and is playing a leading role in the new technologies³.

The publishing sector is rather different. Some of this is local. For example Oxford University Press, formed by the university dates to 1586 when the university was given the right to print books. It is Oxford University's earliest spin-off company and the largest university publishing company in the world. Blackwell (publisher and retailer) can be dated back to the 19th century while in 2002 Routledge moved its journal division from London to Milton Park part of Science Vale UK (see below).

3.3 Labour mobility and skills and the role of policy

The link between the presence of a highly-skilled workforce and the level of new firm formation (Fritsch and Schindele 2011) leading to new path development can be seen in Oxfordshire. Both Oxfordshire, and in particular the City of Oxford's workforce, have a high percentage of people with higher education and professional skills. In 2014, some 60% of Oxford's residents were qualified to NVQ level 4 or above (degree and professional qualifications). This is significantly higher when compared with the South East (39%), and England (36%)⁴.

The presence of the public sector science base as well as R&D intensive firms has also underpinned the evolution and the strength of the county's scientific labour market, a key evolutionary factor in a number of ways. Firm growth has been supported by technicians trained in the laboratories and to a lesser extent in the local

³ <http://www.oxfordshirebusinesssupport.co.uk/content/cryogenics> (accessed August 3 2016).

⁴ https://www.oxford.gov.uk/info/20238/oxfords_economy/943/oxfords_labour_market (accessed August 2nd 2016)

universities. However, there is currently a shortage of technicians. The science base has attracted highly qualified people into the county, many of whom either started companies or who were recruited into the high tech sector (Lawton Smith and Waters, 2011).

Oxfordshire's weakness at lower levels of qualification including technicians has been identified as an important field of local policy interventions (Lawton Smith and Waters, 2011). There are available frameworks at the local level (colleges, schools, universities and public sector bodies) that can be used to leverage responses to local skill shortages. In some cases their efforts are influenced by national policy e.g. national skills policies.

The Oxfordshire skills strategy is a co-ordinated approach⁵ that attempts to identify skill needs for emerging industries. The Oxfordshire Skills Board brings together many public and private employers, secondary, further and higher education skills providers and stakeholder groups. No evaluation about how effective this has been has yet been undertaken.

3.4 Networks and the role of policy

The logic for networks is that they exist to provide events and other contact points for people with similar business and professional interests (Lawton Smith et al., 2012). Networking bodies which organise support for entrepreneurship and innovation include Chambers of Commerce and local branches of the Federation of Small Businesses. In 2008 Oxfordshire had 65 formal networks, ranging from large and

⁵ <http://www.oxfordshireskillsboard.org/> (Accessed August 2nd 2016)

highly specialised networks to smaller networks, for example breakfast clubs. They were particularly effective in developing economic relationships, for example with new customers. In evolutionary terms, networks embody the notion of interdependence between actors and create spillover effects.

Networking in the biotech sector has been supported by public and private sector policy intervention at the local level. This is because of its specialist resource requirements (skills, knowledge, funding) which in part can be met through local relationships. National funding supported Oxfordshire Biotechnet (established in 1987) and the regional development agency (RDA) for South East England (SEEDA). The Oxfordshire Bioscience Network (OBN) has replaced the Oxford BiotechNet as the formal network for the life science sector. It is OBN⁴ acting as a convenor of firms, investors and suppliers that is making a difference through inter-regional, inter-firm linkages. It does this by networking, holding events and organising economic transactions through coordinating elements in the supply chain. Its original base was Oxfordshire but has expanded its scope. Its nearly 400 member companies are located across the Golden Triangle and beyond to Nottingham, Manchester and Scotland.

Such networks, hence local interdependencies, are therefore strongly influenced by policy intervention and are part of the story of new path development. Very early in Oxfordshire's high tech development, in 1985, The Oxford Trust established itself as the focal point for high-tech networking. At this time, there were fewer than 200 high-tech companies (Lawton Smith 1990). It started with half a dozen incubator units, held networking events, started a business angel network (the Oxford Investment Opportunity network OION), and the Oxfordshire BiotechNet.

Through its own spin-off company Oxford Innovation (OI) set up Europe's first innovation centre, Oxford Centre for Innovation (OCFI), was pioneered by Oxford Innovation in 1987. OI went on to manage other innovation centres. In 2006, Oxford Innovation became part of SQW Group, then in 2010, SQW Group acquired the business development function of Fasset, a specialist operator of regional technology parks, positioning Oxford Innovation as the UK's leading operator of Business & Innovation Centres, widening its geographical scope of its support for path development processes⁶.

3.5 Local (and regional) policy capacities in the context of UK's national policy framework

We earlier suggested that EEG neglects multi-scalarity in policy making, overlooking the relative impact of national policies and institutions (for example the regulatory environment, the financial system etc.) on regional development and growth (see also Dawley et al., 2015). Here we address in which ways local policy has the capacity to influence innovation-led new path development) within an overall national policy

⁶ <http://www.oxin-centres.co.uk/our-history> (accessed October 14 2015)

framework. This encompasses the broader role of the state in the economy through for example regulation and large scale infrastructure such as roads, rail and airports as well as decisions on local policy strategies. The complexity of changes in delivery highlights problems of conceptualising policy intervention at the sub-national level from an EEG perspective within multi-scalar polities. Moreover, the agency of individuals in decision-making as well as action (Feldman et al., 2005, Autio et al. 2014) is important. Indeed the *Oxfordshire Innovation Engine* (SQW 2013, 6) identified the perception ‘that Oxfordshire has lacked the strong leadership and consistent messaging that have benefitted some competitor locations, not least Cambridge’.

The significance of the regional rather than the local scale is that localities that rely on strong intermediate or regional authority to stimulate national state action, are better off than localities which cannot rely on such an authority (Dawley et al. 2015). In the UK, the background to policy which sets the possibilities for current local leverage is the abolition in 2012 of the eight regional authorities, RDAs, for England (plus London) which covered large, multiple administrative areas, which had an annual budget of some £1.4bn. RDAs had been responsible for the application of central government policy at the regional level and each had its own innovation-led economic growth strategies (Waters and Lawton Smith 2002). Oxfordshire was one of the RDA SEEDA’s eight counties. It has been estimated that some £18 million was spent in Oxfordshire by SEEDA. While no evaluation has been undertaken of the effectiveness

of this particular spend, an assessment of the nine RDAs showed a positive impact on economic development⁷.

The 2010 change of government from the Labour Party to the Coalition (Conservatives and Liberal Democrats) changed agency in science, innovation and entrepreneurship policy processes at local levels. Evidence of this is the announcement that this marks “a change from top down initiatives that ignore the varying needs of different areas” (Deputy Prime Minister 2010, introduction to Local Growth White Paper⁸). The regional scale was then replaced by the local with 39 LEPs (now 38), partnerships between local authorities, businesses, civic, educational and community leaders. Some 20 local authorities belong to more than one LEP, for example Cherwell in Oxfordshire belongs to the South East Midlands LEP which has recently merged with the Northamptonshire LEP. They have a mandate to drive economic growth involving Local Economic Assessment (Local Authorities); their Strategic Economic Plan (SEP); European Structural and Investment Funds (ESIF) – Strategy; Enterprise Zones, City Deals, Science and Innovation Audits but not now the EU’s Europe 2020 Smart Specialisation S3 agenda. The ESIF programme including the Smart Specialisation Strategy for England was submitted in April 2015⁹.

LEPs have taken on increased responsibility for significant amounts of central government funding (National Audit Office, NAO 2016) and have been set a considerable challenge: ‘to unite ’multi-level, cross-sector interests in a way that

⁷ <http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/whatwedo/regional/regional-dev-agencies/Regional%20Development%20Agency%20Impact%20Evaluation/page50725.html> (accessed March 8 2017)

⁸ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32076/cm7961-local-growth-white-paper.pdf (accessed October 27 2013)

⁹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/436242/bis-15-310-smart-specialisation-in-england-submission-to-european-commission.pdf (accessed August 2nd 2017)

enables the regeneration and growth of places' (Pugalis and Shutt 2012, 1). These include actions such as transport and infrastructure developments that have visible outcomes. In 2014, the government announced that it had agreed Growth Deals with each of the 39 LEPs, through which it indicatively allocated £6.3 billion of the Local Growth Fund. Each LEP's Growth Deal was awarded based on the strength of their multi-year strategic economic plans. A further £1 billion was allocated in January 2015, making the total allocation to date £7.3 billion (NAO 2016).

However, LEPs' capacity to affect local path development is constrained by their own limited resources and by the requirements of central government in designing local strategies. The existence and then subsequent abolition of well-resourced RDAs and the establishment of under-resourced LEPs (a budget of £500,000 p.a.) has created a situation where LEPs unlike RDAs are not accountable for strategy implementation and cannot meet demands placed on them. Their powers and leverage are constrained by their very limited resources, and a lack of strategic and statutory planning powers (Witty, 2013). Moreover, NAO (2016) points out, evaluations of achievements are limited as the government has not set specific quantifiable objectives for what it hopes to achieve through Growth Deals. NAO (2016,6) finds that, 'The English devolution landscape is changing considerably and it is not yet clear how LEPs fit into it. The government regards LEPs as central to its plans for English devolution. However, LEPs are often uncertain of their role within a more devolved landscape, particularly in areas where their economic geography does not align with that of the combined authority'. Moreover, NAO finds that there is a risk that LEPs do not possess the resources necessary to deliver Growth Deal projects.

The proposed introduction of the national industrial strategy (Green Paper 2017)¹⁰ in the context of Brexit, further complicates the policy landscape. It is designed to improve living standards and economic growth by increasing productivity and driving growth across the whole country (page 9). It is not clear what role the LEPs will have as it appears that decisions will be made at the national level even though the Green Paper spells out that the government will work with LEPs ‘to review their role in local growth’ (page 22). This does not sound like a RIS approach, rather more a national innovation systems approach.

Table 4 provides an overview of recent national policies designed to deliver resources to support local intervention. It also offers an account of key actors of local delivery.

¹⁰ https://beisgovuk.citizenspace.com/strategy/industrial-strategy/supporting_documents/buildingourindustrialstrategygreenpaper.pdf (accessed May 17 2017)

National regional policy	Objectives	Local delivery In Oxfordshire
<i>National funds available at local level</i>		
Regional Growth fund, 2011	£1bn fund primarily designed to support economic growth in parts of England hit by public sector cutbacks ¹¹	April 2011 OION was one of five partners in the successful bid submitted by Capital for Enterprise Ltd (CfEL) for a £50 million co-investment fund for supporting small firms.
Growing Places funds 2011	Provides £500m to enable the development of local funds to address infrastructure constraints ¹²	2012 allocated £6m to Oxfordshire for short-term infrastructure delivery associated with housing and employment.
<i>Local/cluster scales of policy delivery</i>		
Enterprise Zones 2011	support new and expanding businesses by offering incentives. businesses are eligible for a business rates discount of up to £55,000 a year for five years. Currently 24 Enterprise Zones across England ¹³ .	Science Vale UK
Local Enterprise Partnerships	Growth through partnerships	Oxfordshire LEP
City Deals 2012	Give participating areas the ability to use budgets better for local needs such as training and skills, roads and other developments. Areas must demonstrate a strong plan for local growth. (infrastructure, entrepreneurship)	Oxford and Oxfordshire City Deal initial award in February 2013, vision is to '[a]ccelerate the growth of the city region's knowledge-based economy'.

Table 4 national and local policy framework operating in Oxfordshire (2011/2012)

Source: Authors' survey

The dirigiste nature of the allocation of funding is evident from the requirement that LEPs strategic plans are to be consistent with national priorities, and will be the basis on which Government negotiates with each LEP. LEPs are also a vehicle for bidding for relevant central government programmes. The majority of resources that directly

¹¹ <http://www.telegraph.co.uk/finance/yourbusiness/7861813/Regional-growth-fund-to-launch-as-public-sector-job-cuts-bite.html> (March 15 2013)

¹² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/7521/2024617.pdf (Accessed March 15 2013)

¹³ <http://enterprisezones.communities.gov.uk/about-enterprise-zones/> (Accessed March 15 2013)

fund the LEP come from Oxfordshire County Council. District councils, business and academia provide in-kind support.

The Oxfordshire LEP established in 2011 is countywide and includes the four district councils and the City of Oxford. Over the period 2008 to 2015, which covers the economic downturn and subsequent recovery, Oxfordshire LEP (3.9%) and London LEP (3.8%) had the highest average annual growth rates for nominal GVA. The strong growth in Oxfordshire has been due to above average growth in information and communication technology (ICT)¹⁴. However, the context is at the national level, Oxfordshire's favourable position within the country's research base is related to its innovation-led economic performance.

Given this favourable background, the LEP is seen as a 'light-touch' body with the overarching aim to be a catalyst for realising Oxfordshire's economic and commercial potential. It is led by a board including members from business, local government and other organisations and universities, has a head start on other regions. Universities as institutions are seen as having a pivotal role in the social and economic development of their regions and in principle in developing smart specialisation strategies. Both Oxford University and Oxford Brookes universities are represented at Pro-Vice Chancellor level on the LEP. However, Oxford's universities have traditionally not been part of the local policy-making system (Lawton Smith 1991, Lawton Smith and Bagchi-Sen 2012). Now their representatives are expected to feed into decisions made on supporting new path development.

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<https://www.ons.gov.uk/economy/grossvalueaddedgva/articles/gvaforlocalenterprisepartnerships/1997to2015> (accessed March 8 2017)

In contrast in Cambridge, the Chamber of Commerce, Cambridge University and local councils (11 organisations altogether) produced ‘The case for Cambridge’ which set out why urgent [central] government action in the form of ‘five asks’ is needed to enable the city to thrive. As in Oxford and London, the other two cities in ‘the golden triangle’ key problems are inequality, unaffordable housing and congested roads¹⁵. The over-arching theme is the need for devolved powers, and can be likened to both RIS and smart specialisation approaches. The Cambridge example illustrates that concerted local action bringing in regional stakeholders (Lawton Smith, 2012) creates the possibility of a dialogue with central government to address local path development issues.

Path development is not articulated as being through the spin-off route (Boschma 2007, 2009) in the 2016 Oxfordshire LEP Strategic Economic Plan (SEP)¹⁶. The vision is of Oxfordshire as being innovation-led economic development, ‘as a vibrant, sustainable, inclusive, world leading economy, driven by innovation, enterprise and research excellence’ consistent with a RIS agenda and to some extent smart specialisation. However, the county is not officially a ‘smart region’ in the sense that it is not registered as joining an S3 platform¹⁷ as the UK as a whole is not registered.

Four programme elements of the SEP are **People** – delivering and attracting specialist and flexible skills at all levels, across all sectors (a particular focus of growth fund spending); **Place** – ensuring a strong link between jobs and housing growth, and providing a quality environment that supports and sustains growth; **Enterprise** –

¹⁵ <http://www.cambridgeahead.co.uk/the-case-for-cambridge/> (accessed July 24 2016)

¹⁶ <http://www.oxfordshirelep.com/sites/default/files/Oxfordshire-SEP-2016-Final-with-images.pdf> (accessed May 12 2017)

¹⁷ <http://s3platform.jrc.ec.europa.eu/s3-platform-registered-regions> (accessed May 12 2017)

emphasising innovation-led growth, underpinned by the strength of Oxfordshire's research, business collaboration and supply chain potential; recognising and reinforcing the significant contribution made by all sectors, in all parts of Oxfordshire and all types of business; and **Connectivity** – enabling people, goods and services to move more freely, connect more easily; improving broadband and mobile coverage and capacity. The elements of a RIS are stated as ensuring that inter-relationships and opportunities across these programmes are fully exploited having previously recognised a lack of coordination in the enterprise and innovation elements of the SEP.

However, in comparison with Cambridgeshire, Oxfordshire is under-resourced and lacks leadership and a united strategy with local partners (Cambridge City Council, Cambridgeshire County Council, South Cambridgeshire District Council, University of Cambridge, Greater Cambridge Greater Peterborough Local Enterprise Partnership. The Greater Cambridge's City Deal is worth £600m. Oxfordshire's £24.2m (January 2017) from the third round of the Local Growth Fund is little slender by comparison¹⁸.

In Oxfordshire, Science Vale UK (SVUK) has had a demonstrable impact on path development processes. This has elements of both RIS and S3. It is a public-private collaboration between Harwell, Milton Park (the largest business/science park in the county), two adjacent local district councils which now share a common management structure and services (Vale of White Horse and South Oxfordshire)¹⁹, the Oxfordshire LEP, Oxfordshire County Council and the Science and Technology Facilities Council (STFC) RAL.

¹⁸

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/589197/170202_Oxfordshire_LEP_GD_factsheet.pdf (accessed May 17 2017)

¹⁹ <http://www.sciencevale.com/> accessed 13 January 2013

Its impact so far is that it has attracted national funding in the form of a UK Government Enterprise Zone (EZ). These EZ's offer flexible planning regimes and 100% business rate discounts for up to 5 years. The SVUK EZ is designed to deliver 200,000 sqm of new employment land at Milton Park (an important local business park) and Harwell. In March 2017 it was announced that a new £24m development would include offices and two high tech laboratories and create an extra 1000 jobs. Previous Growth Deal Investments have been used to fund the Centre for Applied Superconductivity. This is a new centre of innovation designed 'to coordinate the interaction between key industry players, Oxford University, cryogenics companies and end users (including SMEs) on the Harwell campus and at the Culham Centre for Fusion Research Campus'²⁰.

This is an example of where policy intervention, in conjunction with the private sector, at the local level has addressed resource and infrastructure issues including leveraging national funding. Local targets here are thereby more likely to be realized than in other policy-fragmented parts of the county. Indeed at county level, at the same time there is no agreement on plans for a single unity authority.

The practices adopted in SVUK are consistent with good practice identified in the evaluation of COR (2015) on the European Entrepreneurial Regions (EER) project. This was based on successful innovation policies in 11 of the 15 EER regions. The main achievements of EER both at SME and territorial level, identified by Committee of Regions (COR) (2015) include amongst others: change in stakeholder attitude

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https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/589197/170202_Oxfordshire_LEP_GD_factsheet.pdf (accessed May 17 2017).

towards innovation; an increase in R&D investment (especially among SMEs); an increase in employment; better collaboration between the research sector and firms; an increase in the number of innovative start-ups; and, positive externalities for the territories (innovation initiatives are an important policy instrument to combat the negative effects of the financial crisis).

4. Conclusions

The purpose of this chapter is to engage in discussions about how the EEG approach might incorporate the role of public policy in relation to path development processes. We have extended Boschma's (2007, 2009) EEG approach by other frameworks (RIS, S3) to provide a comprehensive and practical approach to understanding the role of policy in shaping new path development. Oxfordshire is used to point to elements that need to be taken into consideration in addition to elements highlighted by EEG, i.e., spin-offs, labour mobility and networks.

The relevance of the Oxfordshire case for other types of regions (high-tech or less favoured regions) is to demonstrate multiple path dependencies operating alongside isolated events and policy actions. Some of these match the RIS approach – which has advantage of providing a framework for analysis of the presence and - absence - of systemic processes. However, the concept of new path development in the EEG approach is conceptually important, even though the three processes identified by Boschma (2009) are not necessarily consistent with policy targets. It is argued that the possibility of change in local paths of development should be analysed within a context of multi-level governance. This is missing in the EEG approach and therefore the RIS approach is complementary for developing 'smart' policies.

In Oxfordshire instead of a coherent RIS strategy, several elements of interconnected but not orchestrated path developments can be found. Some of these are private sector led but have to be seen in the context of a very strong (mainly nationally funded) science-base. This complexity inevitably has inbuilt tensions due to conflicting priorities (e.g. national versus local), confusion as to delivery and actual spend.

The chapter has cast light on three themes. The first is that path development is not confined to local processes of public and private sector intervention and therefore that spillover effects and outcomes are multi-scalar. Agency (Boschma et al. 2017), particularly policy agency is also multiscalar. It is not just the co-existence of multiple scales that matters, it is the interplay between them, even between the national and local level, that is important in determining under what conditions and in which ways public policy can make a difference. Although recent developments in EEG have considered agency, including institutional entrepreneurs (Boschma et al. 2017), the issue of multi-scalarity has not been adequately conceptualised.

Second, the time dimension in relation to the changing targets of policy in relation to economic development needs to be emphasised. This is not only in relation to the consequences of political change in path dependent processes but also in the changing role of key local organisations e.g. universities and local innovation support bodies, and whether they chose, or are incentivised, to act together with others in order to be able to make local problems more resolvable by local intervention (as in the Science Vale UK case, where a RIS approach is embedded in this institutional structure).

The UK case provides examples of national funding initiatives which in principle offer local policy organisations the power to adapt policies to local needs, strategic plans still need to be consistent with national policies, rather than form the basis of an RIS. Hence there are examples where national governments are pushed to devolve more powers for example on skills development, or in Cambridge where agency of collective actors at the local level is being used to request help to deliver more effective local policies.

Finally, the national state is very significant in shaping regional policy in the UK. Its impact is felt through science spending by which £1 of public funding will give rise to an increase in private funding of between £1.13 and £1.60 (BIS/Economic Insight 2015)²¹ and through priorities which determine the allocation of national funds to be used at the local level. Future work should seek to further conceptualise and empirically investigate the complexity of economic development and policy processes using both EEG and RIS frameworks to increase our knowledge about the role of policy in new path development.

²¹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf (accessed May 21 2017)

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