Innovation Evidence Review

Billing, Chloe

[Link to publication on Research at Birmingham portal](#)

INNOVATION EVIDENCE REVIEW

LOCAL POLICY INNOVATION PARTNERSHIP HUB

October 2024

Dr Chloe Billing, City-REDI, University of Birmingham

Contents

Acknowledgements

Executive summary

This review is part of a series produced by the LPIP Hub team at City-REDI at the University of Birmingham, offering a state-of-play on the current policy landscapes and debates relating to effective place-based partnerships in innovation, one of the seven primary themes of the Local Policy Innovation Programme (LPIP), as determined by UKRI. The aim of the review is to identify key questions, offer a 'state-of-the-art' picture of current academic and policy literature, and consider key themes and strands of research for further investigation in innovation policy throughout the LPIP programme. The review is designed to help those in the Local Partnerships (LPs) better understand how to design effective place-based interventions that foster innovation, and to understand the common challenges and pitfalls to effective partnership working in innovation contexts, as well as examples of good practice to minimise risk. The key findings emerging from this review on innovation policies for local places, are as follows:

Key Finding: Importance of Innovation and Technology Policies

Innovation, defined as transforming ideas into value, is essential for productivity and prosperity. Both technology push and demand-pull policies are necessary to build capacity, capability, and confidence in innovation.

Key takeaway
A strong, balanced innovation policy incorporating both technology push and demand-pull approaches can improve lives, services, and businesses across the UK, fostering a fairer, healthier, and more resilient society by supporting local ecosystems and addressing regional needs.

Key Finding: Empowering Local Leaders and Research Funding

Several sources emphasise the importance of devolving more autonomy and decision-making power to local leaders, including increased local influence over national R&D spending and targeted incentives for local research priorities.

Key takeaway
Decentralising some national funding and policy controls to relevant scales can enhance local innovation and focus research on community-specific challenges, but careful consideration is needed to determine the appropriate geographical scale for different types of policies.

Key Finding: Collaboration, Partnerships, and Skills Development

There is a consistent focus on the importance of collaboration between government, businesses, academia, and other stakeholders within regions to drive innovation ecosystems. This includes

developing local STEM skills and aligning training programmes with the talent needs of innovative companies.

Key takeaway
Partnerships can enhance knowledge sharing and create more robust, interconnected innovation ecosystems. Connecting innovation policies with broader skills policies can create a more robust local talent pipeline, supporting the growth of innovative industries.

Key Finding: Place-based Approaches and Cluster Development

Innovation policies are increasingly shifting towards cooperative, multi-actor, and more 'place-based' approaches, with a focus on supporting innovation clusters.

Key takeaway
Supporting cluster growth is viewed as an impactful local innovation policy, requiring frameworks to assess growth potential and learn from successful cases. This approach can help tailor innovation strategies to local strengths and needs.

Key Finding: Evidence-Based and Experimental Policies

There are calls for more evidence-based and experimental approaches to designing local innovation policies, including rigorous evaluation and regular benchmarking.

Key takeaway
Implementing rigorous evaluation methods and regular benchmarking of local innovation dynamics can help track progress, inform targeted policies, and identify emerging innovative places, leading to more effective and adaptable innovation strategies.

Introduction

About this review

This review is designed to synthesise key evidence and policy questions relating to the theme of innovation, and specifically what is most relevant to the focus of the four LPIPs - rural Wales, the Forth river basin in Scotland, Yorkshire and Humber, and Northern Ireland. The four LPIPs represent diverse places across the UK but share a common goal to support local innovation through collaborative ecosystems for the benefit of their wider regional areas. The Rural Wales LPIP aims to gather and apply evidence on achieving inclusive, sustainable growth by overcoming rural challenges. The Stirling LPIP aims to optimise outcomes from water and water resources using the Forth Water Basin, which extends across seven of Scotland's local authorities. The Yorkshire and Humber LPIP seeks to empower marginalised communities, increase local data use, expand entrepreneurship, and move towards net zero emissions. The Northern Ireland LPIP provides an open think tank model for evidence-based policies/programmes targeting economic inactivity.

The review adopts the following structure: It begins by introducing the context for the study. The review then delves into National Policy Levers and Challenges, followed by a Local Level Overview of Key Policies, suggesting a multi-scale approach to the analysis. It explores the varying capacities of different places to innovate in policy-making related to innovation itself. I then highlight effective place-based interventions, drawing lessons from existing initiatives. The review then broadens its scope to examine Innovation Internationally, potentially for comparative insights. It concludes with a summary of findings and identifies areas for future research.

What do we mean by innovation?

Innovation is the "outcome of a process in which relevant knowledge and resources are used to convert an idea into value" (51). This idea can relate to both products and processes, and lead to either a **radical** or **incremental** change. The UK definition of innovation is based on an Organisation for Economic Co-operation and Development (OECD) definition, outlined in the Oslo Manual 2018. This definition includes any of the following activities (16):

1. The introduction of a new or significantly improved product (good or service) or process;
2. Engagement in innovation projects not yet complete, scaled back, or abandoned;
3. New and significantly improved forms of organisation, business structures or practices, and marketing concepts or strategies;
4. Investment activities in areas such as internal research and development, training, acquisition of external knowledge or machinery and equipment linked to innovation activities.

A business that has engaged in any of the activities described in points 1 to 3 is defined as being 'innovation active'. A business that has engaged in any of the activities described in points 1 to 4 is defined as a 'broader innovator'. Finally, any businesses that have engaged in the activity described in point 3 were classed as a 'wider innovator' (16).

Innovation is a key driver of productivity, prosperity and growth and is at the core of Government economic policy (17; 36). The 2020 R&D Roadmap argued that a successful innovation policy will

"improve lives, services and businesses right around the UK and beyond – creating a fairer, healthier, more prosperous and more resilient society" (13). The 2020 R&D Roadmap was a government strategy outlining plans to make the United Kingdom a global leader in science and technology, aiming to increase research investment and foster innovation across various sectors. It was important because it set out the UK's vision for enhancing its research capabilities, attracting talent, and driving economic growth through scientific and technological advancements in a post-Brexit context.

A significant proportion of innovation occurs at the process level and does not necessarily constitute new-to-market innovations. Therefore, **incremental innovation**, such as better integrating and improving existing technologies to benefit citizens in a region, is as important as developing new technological breakthroughs **(radical innovation).** To build capacity, capability, and confidence in innovation, an incentive structure is required within a supportive innovation ecosystem. A successful **innovation ecosystem** is one where businesses can seamlessly navigate and access the necessary facilities, funding, and advisory support to foster innovation. This ecosystem thrives on collaboration among businesses, universities, public institutions, charitable organisations, and private sector investors, all contributing as essential partners.

Place-based innovation policy refers to a targeted approach that aims to support innovation ecosystems and foster innovation within specific geographical areas or communities, tailoring strategies and interventions to address the unique needs and aspirations of those local areas. This policy framework recognises that supporting local institutions in their efforts to stimulate innovation is pivotal for achieving broader local economic development objectives. Coordinating a coherent policy mix, continuous monitoring and evaluation, building local policymaking capacity, and adapting strategies based on regional realities are key for successful place-based innovation strategies. Furthermore, aligned measures beyond innovation support are crucial, such as addressing skills gaps, infrastructure deficits, and promoting extra-regional collaboration.

Inclusive innovation is an emerging concept, with different definitions. For example, NESTA (62) suggests innovation policies are inclusive when they consider who benefits from innovations, who participates in creating them, and who decides priorities and manages innovation outcomes. Innovation is inherently disruptive, creating winners and losers with gains often unevenly distributed, particularly for technological innovation. Disadvantaged groups are frequently underrepresented in innovation activities and do not gain from higher wages in advanced sectors. There are concerns that corporate interests dominate innovation funding, focusing resources on affluent rather than deprived areas. Therefore, highly innovative cities and regions can experience polarised labour markets and lower real wages for many groups (44). Consequently, there is a need to make innovation policies more inclusive. The following delivery approaches are recommended by the **UK Innovation Districts Group (67):**

- Widening participation in research and discovery, developing skills & talent: cultivating a talent pipeline and reducing barriers to employment.

- Employment and procurement practices: decent work for all direct and indirect employees of innovation districts and firms.

- Innovating for impact: focusing research efforts on local and global social and environmental challenges.

What matters to the local LPIPs?

'**Inclusive innovation**' was a central theme across all the LPIP bid documents, reflecting the priority placed on ensuring innovation efforts are accessible and beneficial across diverse populations. "LPIP bid document" refers to the research proposals submitted by four selected Local Policy Innovation Partnerships to the ESRC. These documents outline the research plans, methodologies, and objectives of the chosen local partnerships. '**Measuring and quantifying**' the impacts of innovation initiatives, in order to support evidence-based policymaking, was also an area of emphasis across the bid documents. Another major area of focus was '**transformative technologies**' and '**developing skills for innovation**', emphasising the importance of building capabilities to drive innovation forward. Additionally, the role of '**innovation ecosystems**' was a recurring topic, concerned with exploring how different actors in a given location can interact and form networks, both internally and externally.

Collectively, the LPIPS recognise that innovation is most effective when pursued through collaborative ecosystems, with a purposeful distribution of autonomy, focusing on developing relevant skills, leveraging transformative technologies, and taking an inclusive approach with mechanisms to quantify impacts and outcomes to guide decision-making and support successful, innovative places.

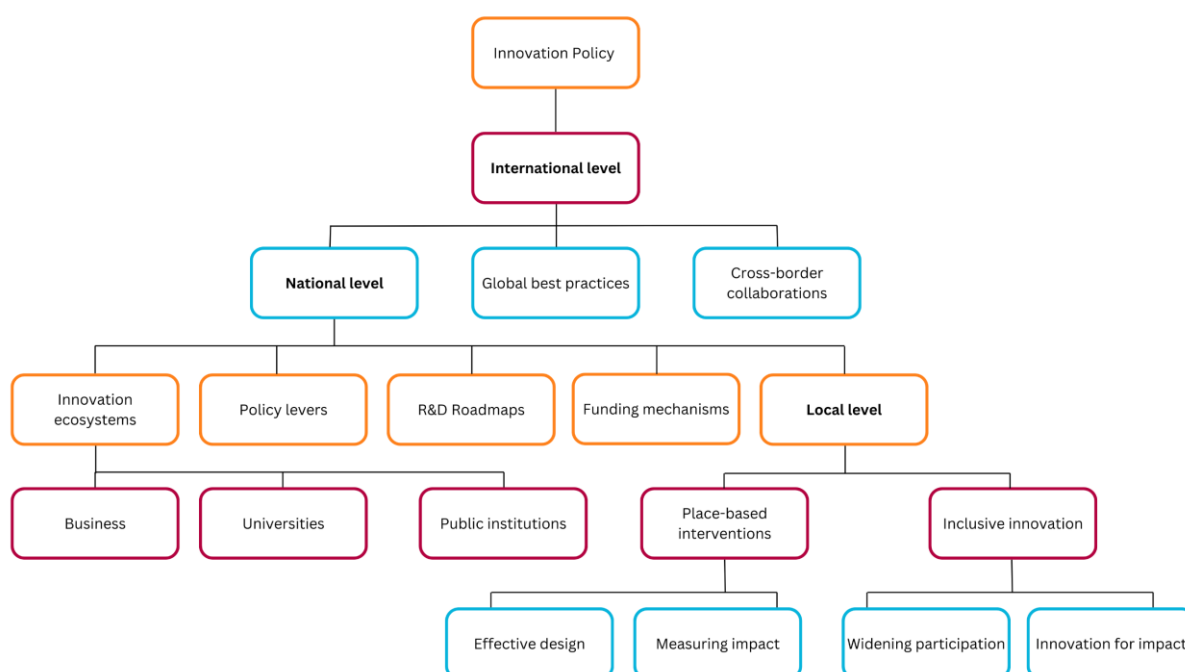## Our approach to understanding innovation policy

Figure 1- the multi-level structure of innovation policy

This diagram illustrates the multi-level structure of innovation policy, from international to national to local levels. At the international level, global best practices and cross-border collaborations inform broader strategies. These feed into the national level, where policy levers,

R&D roadmaps, and funding mechanisms are developed, alongside the innovation ecosystem involving businesses, universities, and public institutions. Finally, at the local level, the focus shifts to place-based interventions and inclusive innovation, emphasising effective design, impact measurement, widening participation, and innovating for societal impact. The review aims to inform our understanding of these interconnected layers of innovation policy, specifically how they interact and influence each other. It seeks to understand the challenges and opportunities at each level, with a particular emphasis on effective local implementation of innovation strategies. By analysing existing interventions, policy mechanisms, and ecosystem dynamics, the review hopes to provide insights into designing more effective, inclusive, and impactful innovation policies that can drive economic growth, address societal challenges across different geographical scales.

Key questions

The burning questions pertinent to place that need answering in relation to innovation, are as outlined below. These questions aim to reveal what drives innovation in specific areas, identify obstacles and supports for effective policy implementation. Answering these questions is crucial for creating focused, effective, and inclusive innovation policies that can adapt to the unique needs of different places, leading to sustainable and fair development:

1 - Strengthening the Innovation Ecosystem:

- How can local strengths and existing capabilities be effectively leveraged and built upon to drive innovation in a region, rather than trying to create entirely new clusters?
- What strategies can be implemented to ensure equitable access to resources and opportunities for businesses of varying sizes and sectors within a local innovation ecosystem?

2 - Skills for Innovation:
- What skills and workforce capabilities are most crucial for fostering a robust local innovation ecosystem, and how can skills gaps be addressed?
- How can interventions be specifically tailored to address the unique needs of businesses operating within a particular locality, considering the interplay of local, system-wide, and sector-specific factors?

3 - Both Radical and Incremental Innovation:
- To what extent is 'transformative innovation'; 'mission-oriented innovation policy'; and 'grand challenge innovation' relevant to the LPIPs? (48)
- What mechanisms and policies are most successful in promoting the diffusion and adoption of existing innovations by local firms, rather than focusing solely on frontier R&D?
- How can collaborative efforts be leveraged to mitigate sector-specific challenges that are particularly prevalent in specific geographic areas, and what role can transformative technologies play in this?

4 - Inclusive Innovation:
- How can innovation ecosystems be made more inclusive to ensure the benefits are spread widely across different groups, locations, and types of businesses within a region?
- What are the most impactful strategies within place-based innovation policies that support local institutions in addressing community needs aligned with economic development objectives?

5 - Measuring and Evaluating Impact:
- What metrics or indicators can accurately assess the success and impact of place-based innovation policies in stimulating local economies and fostering sustainable growth?
- How can continuous monitoring, evaluation and adaptation of strategies occur based on regional realities?

National policy levers and challenges

This section provides a national-level overview of the policies and policy drivers related to place-based innovation. It covers the following aspects:

1. National Policies: it outlines the policies that exist at the national level (either UK-wide or devolved governments of Scotland, Wales, and Northern Ireland) that have an impact on innovation.

2. Policy Drivers: identifies and explains the key factors or motivations driving the development and implementation of these national policies.

Research and development (R&D) is an important driver of innovation, thus **'innovation policy'** overlaps considerably with **'R&D policy',** which includes research, science and technology policies (12). Innovation policy is broader than R&D policy, since it also includes commercialisation and various demand-side policies. In the UK, the **Innovation Strategy (2021)**, **Levelling Up White Paper (2022)**, and **Science and Technology Framework (2023)** all focus on the importance of strengthening research and innovation. These expectations are further elaborated in strategic delivery plans across government departments and Research Development and Innovation (RD&I) organisations, including the recent **UKRI Five-Year Strategy (2022)**, which outline policies to sustain and grow innovative places while unlocking potential in other areas. These policies help channel resources to firms in order to incentivise or reward innovation efforts (8). They include:

1. **Direct support**: subsidies on R&D projects (i.e., sharing the cost of R&D); provision of finance in the form of grants or providing guarantees to others; public procurement (buying or promising to buy goods or services that result from business innovations); and tax credits (26). These are otherwise referred to as 'downstream market incentives' or 'demand pull' and aim to increase the size of markets (52). Initiatives like the **Industrial Strategy Challenge Fund** providing funding for innovative projects and collaborations between businesses and research institutions are an example of direct R&D support.

2. **Indirect support**: the funding of the operation of public colleges and universities; paying third parties to provide services that firms require to innovate (such as government labs); transfer of technology sponsored or held by governments, or preferential access to data such as health or mobility records; supporting knowledge networks. These 'technology push' policies increase the availability of new knowledge. Programmes such as **Knowledge Transfer Partnerships (KTP)** facilitate the transfer of knowledge, skills, and technology from universities to businesses, fostering innovation and enhancing competitiveness. This is important for addressing sector-specific challenges. For example, in areas like healthcare, clean energy, and digital technologies, there are specific initiatives aimed at addressing sectoral challenges, often involving partnerships between public, private, and third-sector organisations. **Regulatory policies** are also an important form of indirect support. For example, the Department for Science, Innovation and Technology (DSIT) recently published a report outlining a pro-innovation approach to AI regulation in the UK (2023). The framework is underpinned by five principles to guide and inform the responsible development and use of AI in all sectors of the economy.

R&D policy is highly centralised in the UK, with the majority of direct government support for R&D, whether in the form of incentives for private research or public funding, determined by central government. Public funding is allocated through **UK Research and Innovation (UKRI)** or similar organisations, most of which sit under the **Department of Science, Innovation and Technology**. Grants for all types of R&D, ranging from basic research at universities to funding designed to translate scientific discoveries into marketable business propositions, are funded centrally. While some schemes have begun to involve local organisations and policy makers – most notably the **Strength in Places Fund** – decisions over how much funding should be spent on different projects remain centralised (69). The Strength in Places Fund (SIPF) was launched in 2018 by UK Research and Innovation (UKRI) as part of the UK government's Industrial Strategy. It's a competitive funding programme designed to support local economic growth by building on

existing research and innovation strengths in specific areas across the UK. Initially, the fund committed £115 million, but by 2023, the total funding allocated had increased to £312 million. The SIPF aims to support innovation-led regional growth by identifying and supporting local research and innovation strengths that can drive significant economic growth. The programme has operated through multiple waves of funding, with the first wave of full-stage funding announced in 2020. Funded projects typically involve collaborations between universities, research organisations, businesses, and local leadership, focusing on initiatives that can make a significant impact on local economic growth in specific areas or regions of the UK. The fund is delivered by UKRI in partnership with the higher education funding bodies of Wales, Scotland, and Northern Ireland.

The NESTA project entitled **"Compendium of Evidence on the Effectiveness of Innovation Policy Intervention Project"** (53) produced 18 reports that set out a typology of innovation policy instruments, distinguishing between direct and indirect instruments, and classifies them based on seven innovation goals. A 2022 report published by the Centre for Economic Performance (CEP) argues that both direct and indirect support is needed, suggesting that a mix of research and development subsidies (including tax credits, grants and incentives), reinvigorated competition and improvements in the quantity and quality of education and training is needed to increase research and innovation (65). Technology push and demand-pull policies are both necessary, given the substantial variation among technologies and between industries (4; 5). For instance, technology push is important in early stages and demand pull in later stages of the R&D process; meanwhile incremental innovations depend on demand pull while radical innovations require technology push. In addition to a mix of policy instruments, there is also a need for innovation policies to be integrated not just with closely connected areas such as skills policies but also with policies for specific sectors, including industrial and economic policy, health policy, environment policy, and defence or security policy (46).

Local level overview of key policies

Innovation policies are increasingly "shifting away from top-down and centralised approaches towards policies that favour cooperative, multi-actor and often more 'place-based' approaches" (56:803). At the local level in the UK, policies impacting innovation can vary across different administrative boundaries, which could include local authorities, counties, combined authorities, or specific districts. The implementation of these policies is often tailored to address the unique needs and opportunities within a particular area. Here is an overview of potential local-level policies impacting innovation:

1. **Local business support programmes:** Local authorities often run programmes that provide support and guidance to businesses within their jurisdiction. This can include facilitating access to funding, advice, and resources necessary for innovation. They may also collaborate with universities, public institutions, and private investors to create a supportive environment for local businesses. For example, the Greater Manchester Business Growth Hub offers free business advice, workshops, and networking events to local entrepreneurs.

2. **Cluster development initiatives:** Local policies may aim to nurture clusters of innovative businesses in specific areas. These initiatives focus on creating an environment that attracts investment and skilled workers. They might involve targeted support for sectors where the region has a competitive advantage, such as technology hubs or creative industries. The Cambridge Science Park, established through local policy support, has become a thriving cluster for tech and biotech companies.

3. **Sector-specific partnerships:** Local authorities often collaborate with businesses, public organisations, and third-sector entities to address sectoral challenges within their area. For instance, partnerships may focus on improving local supply chains, upgrading transport infrastructure, or creating training programmes tailored to the needs of particular industries in the region. The Sheffield City Region's Advanced Manufacturing Innovation District is a prime example of a sector-specific partnership driving local economic growth.

4. **Collaborative networks and innovation hubs:** Local policies may aim to create collaborative networks or innovation hubs where businesses, universities, and other partners come together to share knowledge, resources, and expertise. These hubs serve as focal points for driving innovation and entrepreneurship within a locality. The Engine Shed in Bristol, supported by local policy, acts as a collaborative hub connecting entrepreneurs, academics, and investors in the region's tech sector.

Differentiation in policies at the local level often depends on the region's economic strengths, challenges, and specific opportunities. Policies are tailored to cater to the needs of businesses, address sectoral challenges, and leverage local resources and expertise to drive innovation and economic growth within a particular area.
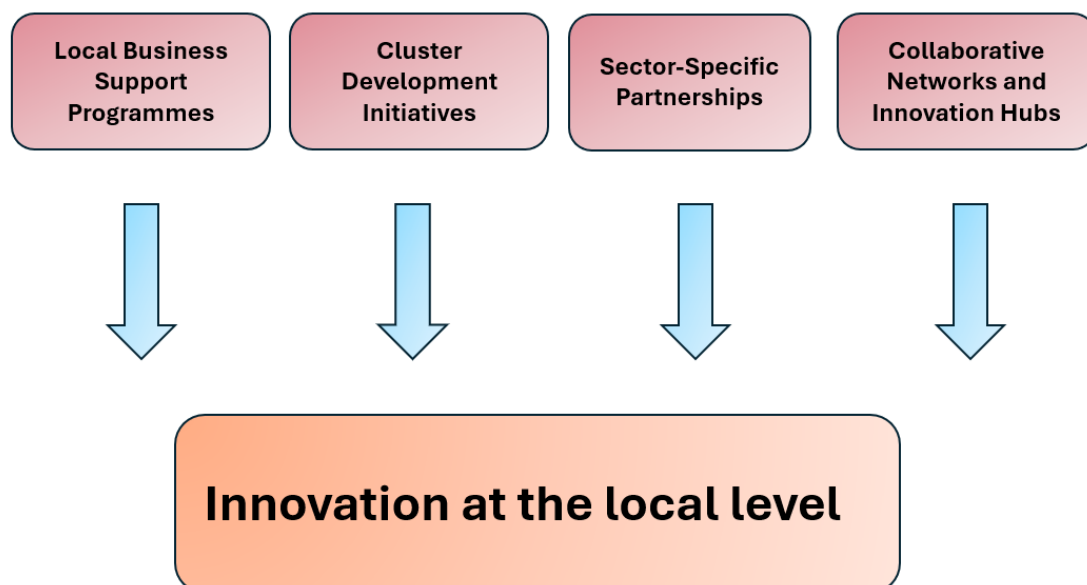

Figure 2- An overview of potential local-level policies impacting innovation

The differential capacity of places for policy innovation in innovation

The approach to innovation policies and budgets varies across the different nations within the United Kingdom due to the devolution of powers to national governments in Northern Ireland, Scotland, and Wales. The governments of Scotland, Wales and Northern Ireland were created in 1999, leaving England as the only nation of the UK legislated for solely by the UK government. In the two decades since devolution, each of the administrations have made different choices about how much to spend on public services and how to manage them (33). Here is a comparison of the innovation policies and budgets across these nations:

England:

- Innovation policies in England are primarily set by the UK government, with a focus on promoting research and development (R&D) across various sectors.

- Significant funding is allocated to support innovation through programmes such as Innovate UK, the government's innovation agency, and the Industrial Strategy Challenge Fund. This is centralised and at the national level. Table A1 below shows the relatively minor role that local authorities and combined authorities play in R&D policy.

- Major initiatives include the development of regional innovation clusters, support for university-industry collaborations, and investments in emerging technologies like artificial intelligence and clean energy.

Northern Ireland:

- The Northern Ireland Executive has devolved powers over innovation policy and funding within the region.

- Initiatives are centred around supporting small and medium-sized enterprises (SMEs), promoting innovation in key sectors like life sciences, and fostering university-industry collaborations.

- Programmes like Innovation Vouchers and the Competence Centre Programme aim to enhance knowledge transfer and R&D capabilities within businesses.

- Funding is allocated through agencies like Invest Northern Ireland and the Northern Ireland Higher Education Innovation Fund.

Scotland:

- The Barnett formula is a mechanism used to adjust the public expenditure allocations for Scotland, Wales, and Northern Ireland based on changes in spending levels in England. It applies to a wide range of public spending, not just innovation funding. The block grant resulting from the Barnett formula can be used by devolved governments to fund innovation initiatives if they choose to do so. This gives them some flexibility in allocating resources to innovation.

- However, it's important to note that not all innovation funding in Scotland and Wales comes from this block grant. There are UK-wide innovation funding streams (such as

those administered by UK Research and Innovation) that operate alongside devolved funding.

- The Scottish Government's dedicated innovation policy, is an example of how a devolved government can choose to prioritize innovation within its overall budget and policy framework. Key initiatives include the Scottish Funding Council's Innovation Centre Programme, which supports industry-led innovation across various sectors.

- Scotland also has a dedicated innovation and enterprise agency, Scottish Enterprise, which provides support for businesses, including funding, advice, and access to expertise.

- Significant investments have been made in areas such as renewable energy, life sciences, and digital technologies.

Wales:

- Innovation policies in Wales are developed by the Welsh Government, with a focus on supporting SMEs, promoting collaboration, and developing key sectors.

- Initiatives include the Smart Innovation programme, which provides funding and support for businesses to develop and commercialize new products and services.

- The Welsh Government also supports innovation through agencies like the Life Sciences Hub Wales and the Compound Semiconductor Project. The Life Sciences Hub Wales is a government-funded organisation that acts as a catalyst for innovation and collaboration in the healthcare and life sciences sectors, connecting industry, health, and research professionals. The Compound Semiconductor Project, also known as CSconnected, is a cluster initiative focused on developing and commercialising compound semiconductor technology in South Wales. This project aims to establish the region as a global leader in compound semiconductor applications, supporting research, development, and manufacturing in this cutting-edge field.

- These initiatives demonstrate how devolved governments can use their funding and policy-making powers to target specific high-growth sectors and foster innovation ecosystems within their regions. They represent strategic investments in areas where Wales has existing strengths, such as advanced manufacturing, energy, and digital technologies.

While there are similarities in the overall goals of promoting innovation and supporting businesses, the specific policies, programmes, and budget allocations vary across the nations, reflecting their unique economic priorities and strengths.

At the sub-national level, the resources available for fostering innovation vary significantly based on the institutional structures, governance, and regional characteristics of different places. As a result, the "current system of devolution is fragmented and uneven" (33).

Low innovation → **High innovation**

Low innovation		High innovation
Rural areas	→	Urban areas
Places without Combined Authorities	→	Places with Combined Authorities
Places with Few/No significant assets	→	Places with significant assets
Places with low absorptive capacity sectors	→	Places with high absorptive capacity sectors
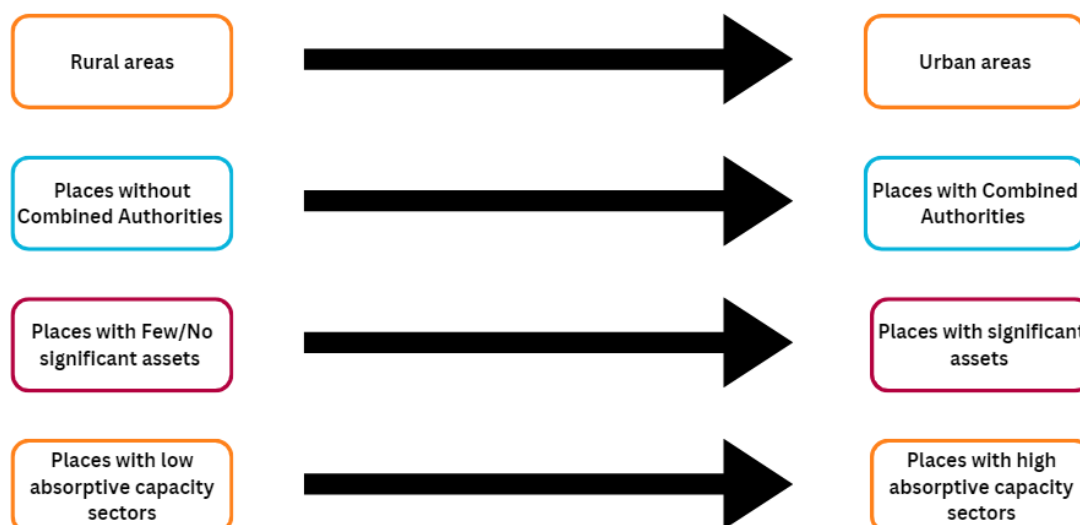
Figure 3- Characteristics that can define place-based innovation

Below are examples of how resources might differ across various types of areas:

1. **Rural vs. urban areas:**

   - In urban areas, there is commonly a higher concentration of resources such as innovation hubs, research institutions, and diverse networks due to the proximity of businesses and institutions. Furthermore, smaller and more rural local authorities are likely to have a smaller and less skilled labour force to draw potential staff from to work on local innovation policy. This is partly because the vast majority of current civil servants, are based in cities or other specific hubs. Towns, or even smaller cities, generally do not have civil servants, with the exception of job centres and some public bodies, like the Office for National Statistics (33).

2. **Places with Combined Authorities vs. those without:**

   - Areas with combined authorities benefit from coordinated efforts and pooled resources across local councils, enabling more comprehensive and strategic approaches to innovation. For example, the Greater Manchester and West Midlands Combined Authorities have sufficient policy making capacity to have a larger role in their local innovation policy. However, local authorities are not always geographically aligned with the institutions used for delivery of public services, like integrated care boards, or those for consulting business leadership, like local enterprise partnerships. This makes co-ordination difficult. Policy-making capacity is also not always a given, since combined authorities vary in size, make-up and institutional maturity. County councils are larger on average, but still only around half the size of Combined Authorities. Although more recently established mayoral combined authorities, such as the York and North Yorkshire Combined Authority founded in 2024, include rural areas, the combined authority model has predominantly been introduced in more urban areas. This sits

awkwardly alongside the complex existing single or two-tier system of local government in other parts of England. Places without combined authorities typically have more fragmented governance structures and are much more constrained in their policy-making capacity, impacting the coherence of innovation strategies (33).

3. **Places with significant assets vs. few/no significant assets:**

   - Areas with significant assets (such as ports, airports, or established industries) might leverage these assets to attract investments and drive innovation, while areas with fewer assets may focus on building unique selling points or niche industries. Additionally, areas with universities often benefit from research collaborations, knowledge exchange, and access to skilled talent. Places without universities might face challenges in accessing research expertise but might compensate by focusing on practical skill-building initiatives. Differences also exist in the availability of funding sources, business support networks, and incubation facilities. Well-established places might have more mature support structures, while emerging regions might focus on building these foundations.

4. **Sectoral challenges and specialisations:**

   - Areas might face distinct sectoral challenges based on their specialisation (e.g., technology, manufacturing, tourism). Solutions and resources might differ based on the unique challenges faced by each sector. Sectors with high absorptive capacity, defined as the ability to identify, assimilate, and apply valuable innovations, are likely to diffuse new technologies most rapidly. Business/professional services exhibit the highest sectoral absorptive capacity levels, while pharmaceuticals and computer/electronics manufacturing also rank highly. In contrast, extractive industries and basic manufacturing activities tend to have low absorptive capacity (20). The Enterprise M3 (EM3) region, covering parts of Surrey and Hampshire, is renowned for its knowledge-intensive, digital, and design-based economy with a vibrant business ecosystem that drives its economic success. (19)

The lack of uniformity at both the national and sub-national level in the division of responsibility on innovation policy creates public confusion around who is providing which local services. The Institute for Government (2024) report (33) that "the 'messy' nature of devolution so far has reduced constituents' understanding of which level of government does what". This means local governments are less incentivised to innovate successfully, as accountability for performance through elections is weak.

Designing effective place-based interventions: What can we learn from existing interventions?

This section explores examples of place-based innovation policies and their outcomes, emphasising the crucial role of partnerships in policy implementation and how local contexts

influence their impact. The scope of this evidence review encompasses academic literature and policy initiatives from 2010 onwards, focusing on the United Kingdom, United States, countries within the EU, Japan, and Switzerland. The selection criteria included systematic searches of academic databases, targeted searches of government and business organisation websites, and identification of relevant policy papers and case studies from international bodies like the OECD, with a focus on strengthening place-based innovation. Various regions have implemented a range of such policies, each targeting different aspects of the innovation ecosystem.

For example, cluster-based policies foster innovation by supporting co-located, industry-specific groups of firms and organisations. Public-funded research and science institutes contribute to private R&D investment through knowledge creation, training, and technology development. To encourage business R&D and innovation, governments employ fiscal incentives and direct support measures, such as tax incentives and grants. Innovation vouchers and prizes serve as tools to promote collaboration between businesses and research institutions, as well as to incentivise breakthroughs in specific areas. Additionally, innovation-framing regulation and procurement policies aim to streamline business support and leverage public purchasing power to drive innovation.

These diverse approaches showcase the array of tools available to policymakers for stimulating local innovation ecosystems and driving economic growth through targeted, place-specific interventions. Many of the reviewed reports also highlight the interconnected relationship between skills systems and innovation capabilities. However, as place-based skills policies are addressed in a companion evidence review on skills, they are not included in this section.

Cluster-based Policy

Clusters are defined as industry or sector-specific groups of firms and intermediary organisations that benefit from positive feedback loops associated with collocation, leading to increased innovation. Clusters that demonstrate evidence of meeting the "RD&I-active" criteria, referring to research, development, and innovation activities, are categorised as innovation clusters (15). These innovation clusters are then classified into the following types: Diverse Clusters, which are co-located groups of firms not specialising in the same industrial sectors, with no solid evidence of collaboration among them. Specialised Clusters, which are co-located groups of firms that specialise in the same industrial sectors but lack solid evidence of collaboration within the cluster. R&D Collaborating Clusters, which are co-located groups of firms with identified collaboration occurring within the cluster. Dispersed Communities, which are groups of firms with evidence of collaboration, but they are spatially dispersed and not co-located, akin to collaboration "communities" rather than physical clusters (15). In 2023, the Department for Science, Innovation and Technology (DSIT) commissioned a consortium of data scientists and economists from Cambridge Econometrics, The Data City and Innovation Caucus to produce an [interactive mapping tool](#) of the UK's RD&I clusters, accessible by businesses and members of the public. The interactive tool and accompanying report showcase RD&I strengths and opportunities that exist across the UK for researchers, governments, businesses and potential investors.

Regions around the world employ cluster-based policies as part of their industrial, innovation and development policy mixes. There is no shortage of evidence on the benefits of clusters and tech clusters. Studies show that the co-location of businesses and institutions generates 'knowledge spillovers' and other positive agglomeration effects. These benefits are generated by the shared pool of expertise, finance, skilled workers, access to component suppliers and channels for

spreading information and innovation. The benefits are not just confined to people and firms within the immediate geography of the cluster, as the impacts often spill over into the wider region. However, this can also spread knowledge to market rivals throughout the economy, so needs to be carefully managed to ensure private firms don't respond to 'market rivalry spillovers' by underinvesting. The importance of clusters reflects the shift from linear to systemic thinking about R&D and innovation and moving away from policy instruments that focus on individual R&D actors to those attempting to develop new or stronger links between actors (46).

The "Understanding Cluster Growth Potential" report (51), proposed a framework to assess the growth potential of place-based innovation clusters. The report included three case studies to illustrate the application of the framework - the Solent Marine and Maritime Cluster focused on net-zero opportunities and evolving in the marine and maritime sector, the Belfast Cybersecurity Cluster operating in the cybersecurity domain, and the East Midlands Medical Technologies Cluster exploring medical technologies. These case studies provide valuable insights into the innovation potential of these clusters and the support needed for their growth in each specific context. Applying the framework revealed structural differences and distinctive growth trajectories across the clusters. The report emphasised looking beyond numerical metrics to assess gaps and potential. In terms of gaps, the approach involved identifying areas where clusters may be lacking in resources, connections, or capabilities that are crucial for their growth. These gaps could include skills shortages, insufficient funding mechanisms, weak links between academia and industry, or underdeveloped infrastructure. Regarding potential, the framework considers factors such as the cluster's capacity for knowledge creation and transfer, its ability to attract and retain talent, the presence of anchor institutions or companies, and the cluster's alignment with emerging market trends or societal challenges. The potential of a cluster might also be assessed in terms of its ability to drive regional economic growth, create high-quality jobs, or contribute to national strategic priorities. By looking beyond simple numerical metrics, the framework allows for a more nuanced understanding of each cluster's unique strengths, challenges, and opportunities for growth. This approach helps policymakers and stakeholders develop more targeted and effective strategies to support cluster development, addressing specific gaps while leveraging and enhancing the cluster's inherent potential.

Each cluster in the 'Understanding Cluster Growth Potential' report had emerging developmental opportunities, shaped by different technologies and industries. Therefore, the barriers to the growth of emerging clusters of activity look different between sectors and across different national and regional contexts. Furthermore, creating entirely new clusters is very difficult, especially at the technological frontier, so policies need to build on existing local strengths (44). Therefore, tailoring to local context is crucial and each area will require different interventions depending on what is already in place and the drivers of growth for specific clusters. For example, investing in the diffusion of existing innovations and adaptation by local firms, rather than frontier R&D, may be more promising for lagging areas in the short-term. However, this is dependent on local policymakers having the capacity and resource to effectively customise strategies (44).

Another noteworthy initiative in understanding and supporting place-based innovation was the UK government's Science and Innovation Audits (SIAs). Launched in 2015, these audits aimed to catalyse a new approach to regional economic development by identifying and building on the research, innovation and infrastructure strengths of specific areas. The SIAs brought together local consortia to analyse their regional strengths and capabilities, helping to inform strategic decision-making for local innovation. While these audits haven't been conducted recently, they represent a valuable model for the kind of comprehensive, place-based innovation assessment

that this review advocates. The SIA approach demonstrates how local stakeholders can collaborate to map their innovation ecosystems, identify opportunities for growth, and develop strategies that build on existing strengths.

Public funded research and science and technology institutes

Public-funded research can boost private investment in R&D in numerous ways, such as increasing the stock of knowledge (which may drive product or process innovation), training graduates, creating new technologies, creating networks, and creating new firms (3). The importance of public-funded research varies between industries and even within sub-sectors: for example, differences in the importance of university research to biofuel and wind technologies, with wind technologies to be more applied and reliant on knowledge from downstream businesses, whereas biofuels are newer, patentable technologies and more reliant on university research (63). Academic patenting and licensing have become increasingly common in recent decades, encouraged by the 1980 US legislation Bayh-Dole Act and other policies. This has led to an extensive set of studies focusing on the positive impacts of IP and academic entrepreneurship on R&D (29; 49; 2; 55; 27). Similarly, many national governments have implemented policies to promote the formation of university spin-off companies in response to their contribution to economic growth (50; 28; 39). A study found a cohort of university spin-off to have a 'performance premium' of 3.4 % points higher employment growth than a comparative group of industry start-ups (11). Another policy instrument aimed to encourage and facilitate university–industry R&D collaboration is the establishment of science parks. A comparison of Finnish firms located within science parks and those outside, showed that the former exhibit relatively better performance in terms of innovative output, at least as reflected in patenting (61).

Fiscal incentives and direct support to firm R&D and innovation

Fiscal incentives and direct grants support firm R&D and innovation in different ways. These impacts have been studied in the OECD Micro-data based insights on trends in business R&D performance and funding (microBeRD) project, which "investigates the structure, distribution and concentration of business R&D and R&D funding and models the incidence and impact of public support for business R&D" (1). The key findings from the microBeRD analysis show that R&D tax incentives not only increase expenditures but also the level of human resources that firms report to dedicate to R&D. Furthermore, "R&D tax incentives encourage additional business R&D both because existing R&D performers increase their R&D expenditure (intensive margin) and because additional firms start performing R&D (extensive margin)". Consequently, expenditure-based R&D tax incentives are a primary business innovation support policy tool across most OECD countries and partner economies (1). In 2017, R&D tax incentives accounted for around 50% of total government support for business R&D in the OECD area, up from 30% in 2000 (1). A study by Centre for Business Research (2021) calculated that the R&D tax credit and Patent Box schemes together now cost the Treasury around £8.4 billion a year. As Table 1 (below) shows, this is an order of magnitude more than the combined total of all other government programmes to fund innovation in UK companies (9).

Table 1: UK Government Policies that help fund Business R&D

Policy	Key features	Estimated annual cost to Treasury	Source
R&D Tax Credits	Subsidy of 13% to 33%	£7.3 billion	HMRC
Patent Box	Subsidy	£1.1 billion	HMRC
Innovate UK Grants Businesses	Subsidy of 25% to 70% of project costs. Most grants involve collaboration between and discussions organisations including universities	£530 million	ONS GERD data and discussions with Innovate UK
SBRI Contracts	100% funded public sector innovation contracts promoted by Innovate UK	£100 million est.	
EIS and SEIS	Subsidy on private investment	investment £540 million	H.M. Treasury
VCTs	Subsidy on private investment in funds	£70 million	H.M. Treasury
British Business Bank	Equity and loans, directly and through partners	Designed to be profitable overall. It provided £1.1 billion of commitments Accounts 2019	British Business Bank Annual Accounts 2019
Advanced Research and Innovation Agency	DARPA/ARPA based agency to fund theme programme manager-initiated projects. Not yet established.	£200 million per annum (£800 million over 4 years)	UK Government announcement

The microBeRD analysis also found that "input additionality of R&D tax incentives" is larger for small and medium-sized firms vis-à-vis large companies. This reflects the fact that smaller firms perform, on average, less R&D than larger firms. Similarly, little input additionality is found for firms in highly R&D intensive industries (pharmaceuticals, computer manufacturing, scientific R&D) (1).

Meanwhile, direct grants support longer-term, high-risk research and often target specific areas that either generate public goods (e.g. health and defence) or have particularly high potential for spillovers. (31) argues that the 'Small Business Innovation Research (SBIR) programme' in the US supports firms by facilitating technology prototyping and demonstration of a technology, which helps to attract additional private VC funding. The microBeRD analysis highlighted that direct grant support measures are more conducive towards promoting research whereas tax support is principally associated with heightened levels of experimental development (1). Therefore, a mix of R&D tax incentives and direct grants are optimal. However, the average effects found in the microBeRD analysis vary across countries. This is in part related to differences in the uptake and distribution of indirect and direct support measures across different types of firms, as well as differences in the national systems of innovation.

Innovation vouchers and prizes

Innovation vouchers provide small grants or vouchers to encourage collaboration between businesses and research institutions. These vouchers can be redeemed for services like R&D, prototyping, or testing. Recent studies (74; 43) provide causal evidence from a randomized controlled trial that innovation vouchers successfully foster innovation projects and improve targeted short- and medium-term innovation outcomes, particularly for SMEs. Positive effects were found on product/service development, patenting, and internal processes depending on the specific goal of the project. The study supported the rationale behind innovation vouchers and recommended that to increase the effectiveness of voucher programmes, policymakers allow longer project timeframes and simplify administrative processes.

Prizes and competitive awards can also be used as a policy tool and are designed to incentivise breakthroughs and solutions in specific areas. They have several positive effects, which include: stimulating research by motivating researchers, inventors, and entrepreneurs to tackle identified challenges; signalling market demand and attracting attention to critical issues; engaging a wide range of participants, fostering diversity in the solutions proposed; and leveraging both private and public resources for maximum impact. Despite these benefits, innovation prizes face certain challenges: the prizes must be well-designed to avoid unintended consequences; similar prizes may overlap and dilute the overall impact if not coordinated; and ensuring the long-term sustainability of the solutions and impact beyond just the prize period is essential.

Innovation-framing regulation and innovation procurement

To support R&D activities policy design should simplify the business support landscape and reduce uncertainty. This relates to the regulatory and budgetary burden imposed by the regulatory system and the need for 'innovation-framing regulation' (60). The literature on innovation-framing regulation argues that public regulators should work "hard to avoid stifling innovation, particularly in a competitive international environment" and "generate 'simply better' regulation that imposes no real costs on anyone and requires no difficult trade-offs" (23). Similarly, regulation should be "outcome-oriented, pragmatic, and data-driven". Ford (2013) argues that there is no such thing as value-neutral, objective, purely technocratic regulation. These institutional barriers apply to public procurement. Therefore, procurement innovation is needed in order to successfully leverage procurement as a tool for increasing the uptake of private R&D investment (71). Recent research focuses renewed attention on the importance of government procurement, in particular with regards to ground-breaking innovations that require large markets to be viable and patient capital to take off the ground (47; 48).

Public procurement represents a powerful yet underutilised lever for governments to drive innovation and address complex societal challenges. With public expenditure on goods and services accounting for 10-15% of GDP in OECD countries, strategic use of this purchasing power could catalyse the development and adoption of cutting-edge solutions by the private sector. Conceptually, public procurement can "pull" innovation by providing assured demand to justify private R&D investments. Public organisations also act as lead users, allowing pivotal interactions between buyers and producers. Additionally, centralised purchasing helps overcome market failures hindering innovation. Awareness of the value of public procurement in stimulating innovation is rising. However, actual implementation lags with few practical guides.

There are several barriers in realising the innovation potential of procurement in practice. These include issues in the public sector such as risk aversion, lack of capabilities, budget fragmentation, and legal uncertainties (71).

Innovation and R&D metrics

The knowledge of 'what works' in innovation policy is somewhat limited by a lack of critical data and evidence of valid counterfactuals. As a result, our understanding is largely based on broader and less specific areas of the literature (8): for example, the role of government funds in enhancing the direction, productivity, and efficiency of R&D (3). These studies focus on different proxy measures of innovation, including the net growth of high-tech jobs (45) . For example, a 2018 report from Eurofound highlights the employment-related effects of innovation support measures, such as the German initiative 'Enterprise value: People'[1]. Other proxy measures of private-sector innovation include: Gross foreign direct investment (value and percentage of gross domestic product); Private-sector spending on R&D (value and percentage of GDP); Patent applications made and granted (total and as a population ratio) and royalty and license fees payments (value and as a population ratio).

Empirical studies, that do focus directly on R&D policy, report both positive and negative links between public and private R&D. First, there exists a complementary relationship (positive) between public R&D (government funded) and private R&D (64). Second, public R&D may crowd out (negative) private R&D, which is called substitution effect (42). There are also different levels of benefits felt across different sectors and firm sizes.

Meanwhile, there are two main measures of 'additionality' of public policies on private sector R&D in the grey literature (18):

- The £ increase in private investment arising from a £1 increase in public investment.
- The coefficient of additionality which measures the percentage increase in private investment arising from a 1% increase in public investment.

An Oxford Economic (2020) report found that each £1 of public R&D stimulates between £0.41 and £0.74 of private R&D within the same year. Furthermore, public R&D continues to influence levels of private spending in subsequent years. The analysis suggests that the long-run impact of public R&D on private R&D is more than three times the short-run impact. The long-run leverage rate is estimated to be between 1.01 and 1.32, suggesting that each £1 of public R&D eventually stimulates between £1.96 and £2.34 of private R&D (58).

However, there is an uneven spread of government R&D spending, resulting in regional disparities in economic performance (Forth and Jones, 2020). This has opened up discussions about strategic approaches to devolved R&D and innovation. In this context, having reliable sets of R&D data is imperative. We should also be aware that the Office of National Statistics (ONS) significantly changed its R&D statistics in recent years. A recent blog by City-REDI explored why detailed R&D data is essential and examines the challenges in current data collection and availability, particularly at the sub-national level. To effectively leverage R&D investments for regional development, the following recommendations were proposed:

---

[1] This is part of a wider 'New Quality in Work Initiative', which aims to promote a new work culture and personnel policy across the German economy, placing an emphasis on work quality as the basis for innovation and competitiveness.

- ***Methodological consistency***: Ensuring consistent data collection methodologies is crucial for reliable trend analysis and comparative studies. Where methodologies are changed, the data should be sufficiently backdated so that the time-series demonstrates continuity across at least the current and previous policy cycles. Changes should not result in a reduction in data granularity, but where possible, should seek to increase it.

- ***Improve data detail and granularity***: Enhancing the detail and specificity of regional and subregional R&D data will allow for more accurate assessments and tailored ***place-based*** interventions. This includes tracking where funds are actually and finally spent. This will help assess the true impact of R&D investments on local economies and labour markets.

- ***Foster collaborative data initiatives***: Encouraging partnerships between local governments, universities, and research organisations would likely help fill data gaps and provide a more comprehensive picture of regional R&D landscapes.

- ***Timely data release***: Making data available promptly, which will facilitate prompt policy adjustments and programme evaluations.

Autonomy of local leaders

The capacity of partnerships to drive responses, depends on the autonomy of local leaders. TheCityUK (2023) (67) 'enabling growth across the UK' report recommends empowering local leaders and providing them with more autonomy over spending and policy decisions to boost innovation. This includes devolving more powers over skills, infrastructure, business support and research funding. The report advocates for increasing collaboration between national and local governments, businesses, academia and other stakeholders to develop place-based innovation strategies tailored to local strengths and needs. It suggests establishing 'Innovation Accelerators' in major cities besides London to boost high-potential clusters and provide anchors for wider regional growth. These would bring together research, skills and business support. The report calls for increased R&D funding focused on local priorities and applied research relevant to local industries and challenges. It argues for allowing greater local influence over national R&D spending.

However, the discussion around the funding of devolved institutions within England remains limited. Tax devolution is missing for example, with a focus on the devolution of tax revenues rather than spending responsibilities (33). Furthermore, the localisation of basic R&D spending could risk under-investment in critical activities such as 'basic research', given the benefits are often accrued outside the local area. Forth and Jones (2020) highlighted that in France for example, local institutions invest a greater proportion of their R&D spending in 'technology transfer' to help local businesses (22). Regional governments are well suited to deliver this later stage R&D, and the benefits are likely to be more local. However, investment in technology transfer means less investment in basic research, which could reflect a disincentive to invest where benefits are accrued elsewhere (33). Furthermore, without co-ordination across places there could be over-funding of some research areas and under-funding of others, resulting in lower quality research outputs overall. Therefore, co-ordinating a coherent national research strategy, with sufficient funding for each of the UK's scientific strengths, is better suited to being delivered at the national level. In contrast, research closer to market can be integrated into a local

industrial strategy and would benefit from local insights. This is the rationale behind the three 'innovation accelerators' in three city-regions.

Figure 4- Areas outside of London, like Manchester analytical capacity

Overall, a mix of national and devolved funding is needed to accommodate different areas of policy (33). For this to be successful, local institutions need to be equipped with the analytical capacity to make good decisions over innovation spending allocations. This is more likely at the combined authority level, as opposed to the lower tiers of governance. However, combined authorities currently have very different budgets, powers and track records. When surveyed in 2019, the number of staff employed directly by the combined authorities varied from 2,013 in Greater Manchester to just 51 in Cambridgeshire and Peterborough (33). Additionally, in the policy areas where combined authorities have powers, such as transport and skills, much of the funding is conditional on the delivery of specific programmes and it is central government that sets out the parameters and objectives of the specific fund.

Other examples

Other examples of place-based policies which support collaboration and innovation include (53):

1. Open Innovation Platforms: These digital platforms facilitate collaboration across sectors, allowing organizations to share data, insights, and resources.

2. Innovation Sandboxes: Establish safe spaces for experimentation, where regulations are relaxed to encourage innovation.

3. Innovation Fellowships: Fund researchers, entrepreneurs, and practitioners to work on cross-disciplinary projects.

4. Living Labs: Create real-world test environments where new technologies and services can be trialled. Cities like Barcelona and Amsterdam have successfully implemented living labs for urban innovation.

5. Innovation Scouts: Appoint scouts to identify promising innovations and connect them with potential adopters.

Innovation internationally

International examples of place-based innovation policies demonstrate how various countries have strategically developed local capacity to drive innovation and economic development. These initiatives showcase the importance of targeted approaches that leverage local strengths and foster collaboration among diverse stakeholders.

The examples provided illustrate a range of strategies implemented across different countries. The scope of this evidence review encompasses academic literature and policy initiatives from 2010 onwards, focusing on the United Kingdom, United States, countries within the EU, Japan, and Switzerland. The selection criteria included systematic searches of academic databases, targeted searches of government and business organisation websites, and identification of relevant policy papers and case studies from international bodies like the OECD, with a focus on strengthening place-based innovation. In the Netherlands, two distinct approaches are highlighted. The Dutch Innovation Vouchers scheme aims to increase R&D and innovation capabilities of SMEs by encouraging collaboration with public research institutions. This policy fosters knowledge transfer and strengthens the quality and relevance of public research. Additionally, the Brainport Eindhoven initiative focuses on developing high-tech industries through a collaborative ecosystem that brings together businesses, research institutions, and government bodies. Spain's 22@ Innovation District in Barcelona exemplifies how urban regeneration can be combined with innovation policy. This project transformed a former industrial area into a thriving hub for knowledge-intensive industries, R&D centres, and creative enterprises. Finally, Singapore's Jurong Innovation District represents an ambitious effort to integrate advanced manufacturing, technology, and academia in a single location. This initiative aims to create a comprehensive ecosystem that encourages experimentation and innovation across various sectors.

Dutch innovation vouchers

Theis policy measure aims at an increasing R&D and innovation capabilities of SMEs by fostering collaboration with public research institutions and RTOs, improving knowledge transfer and by strengthening quality and relevance of public R&D. The Innovation Voucher has been introduced to inspire SMEs to utilise the opportunities and potential of knowledge institutions. At the same time, the Innovation Voucher Scheme is expected to enhance the awareness at knowledge institutions of the need for knowledge and thus secure the quality and societal relevance of public research. The scheme is open for projects within all scientific fields and the administrative structure of the scheme is designed in a manner to reduce bureaucratic measures as much as possible for the project participants. The Council of Technology and Innovation is responsible for the scheme and has decided that state co-funding is channelled directly from the Danish Agency of Science, Technology and Innovation to the research or technological partners of the projects, relieving the SME from the burden of invoicing its project partner (65). The Dutch innovation

vouchers were allocated randomly by means of lottery among applicant firms, allowing a study by Roelandt and Van der Wiel (2020) to assess whether this innovation instrument works or not. In principle, any difference between the firms with a voucher and firms without a voucher is the result of the intervention. To estimate the long run impact, they merged data of both the treatment and the control group with their long-term performance data collected by Statistics Netherlands over the period 2004-2016. They found that innovation vouchers have had a positive impact on a number of key performance indicators in the (medium) long term.

Barcelona, Spain - 22@ Innovation District:

Barcelona's 22@ Innovation District is a transformative project that has revitalised a former industrial area into a hub for innovation and technology. The initiative aimed to create a conducive environment for knowledge-intensive industries, R&D centres, and creative enterprises. Through partnerships between the public sector, universities, and private entities, the project focused on attracting businesses in the technology and innovation sectors. It provided facilities, funding, and tailored support for startups, fostering an ecosystem where businesses could access resources needed for innovation. Evidence suggests that this initiative has successfully attracted investment, created job opportunities, and stimulated economic growth in the region, transforming a previously underutilised area into a vibrant hub for innovation and entrepreneurship (59).

The Netherlands - Brainport Eindhoven:

Brainport Eindhoven is a collaborative initiative in the Netherlands that focuses on the development of high-tech industries, particularly in the Eindhoven region. This initiative brings

together various stakeholders, including businesses, research institutions, and government bodies, to stimulate innovation and economic growth. The partnership focuses on creating an ecosystem that supports knowledge sharing, facilitates access to funding and infrastructure, and encourages collaboration between businesses and research institutions. The emphasis is on developing cutting-edge technologies and fostering clusters of innovative businesses. Evidence suggests that this initiative has led to significant economic growth, attracting investments from tech giants and startups alike. It has facilitated the emergence of a high-tech ecosystem, driving innovation, job creation, and positioning the region as a global technology hotspot (30).

Singapore - Jurong Innovation District:

Singapore's Jurong Innovation District (JID) is an ambitious project that aims to integrate advanced manufacturing, technology, and academia in a single location. The district fosters collaborations between industry players, research institutions, and government agencies. Through strategic planning and targeted investments in infrastructure, research facilities, and innovation-focused education, the JID aims to attract businesses and researchers, encouraging experimentation and innovation in various sectors. Early evidence suggests positive outcomes, with the JID serving as a testbed for new technologies, fostering interdisciplinary collaborations, and contributing to Singapore's goal of becoming a global innovation hub.

These case studies showcase how different countries have strategically developed capacity in specific regions or districts to drive innovation and economic development. These initiatives emphasise the importance of partnerships, tailored support, infrastructure investments, and ecosystem-building to create successful innovation hubs. Evaluations and evidence suggest that these approaches have had tangible impacts, attracting investment, creating jobs, and fostering vibrant innovation ecosystems (41;42).

Conclusions and questions for future research

Key challenges, issues, and opportunities lie in finding effective ways to strengthen local innovation ecosystems, foster the right skills for innovation, support both radical and incremental innovation, promote inclusive innovation, and accurately measure the impact of place-based policies. To ensure these burning questions are addressed, we recommend that funding bodies, policymakers, and research institutions prioritise the following research efforts:

Conducting comprehensive case studies and comparative analyses across diverse regions and sectors will provide valuable insights into the unique dynamics and challenges faced by different local innovation ecosystems. This approach can uncover best practices, success factors, and potential pitfalls, informing the development of tailored strategies and interventions. **These studies should be conducted by multidisciplinary research teams in collaboration with local stakeholders.**

Fostering cross-disciplinary collaborations and knowledge-sharing among academics, policymakers, industry leaders, and community stakeholders is crucial. By bringing together diverse perspectives and expertise, future research can holistically address the multifaceted nature of local innovation challenges and facilitate the co-creation of solutions that are both theoretically sound and practically implementable. **This should include a stronger emphasis on integrating Arts, Humanities, and Social Sciences (AHSS) perspectives with STEM fields to create more comprehensive and inclusive innovation support mechanisms**.

Developing robust frameworks and methodologies for measuring and evaluating the impact of place-based innovation policies is a pressing need. Without reliable metrics and assessment tools, it becomes difficult to gauge the effectiveness of interventions and make evidence-informed/data-driven decisions. **Research institutions and policymaking bodies should collaborate** to devise comprehensive evaluation approaches that capture both quantitative and qualitative dimensions of local innovation ecosystems.

Encouraging long-term, longitudinal studies is essential to capture the dynamic and evolving nature of local innovation ecosystems. Short-term snapshots may fail to fully account for the complex interplay of factors that unfold over time, potentially leading to incomplete or misleading conclusions. **Funding bodies should prioritise** sustained research efforts to provide a more nuanced understanding of how local innovation ecosystems adapt and respond to changing circumstances.

Exploring innovative funding mechanisms and incentive structures can help support research initiatives focused on addressing these key challenges and opportunities. Traditional funding models may not always align with the specific needs and timelines of place-based innovation research. **We recommend that funding bodies, in partnership with Higher Education Institutions (HEIs), businesses, and the public sector, explore alternative funding sources, such as public-private partnerships, crowdsourcing, or impact investment models. These mechanisms should aim to incentivise collaborative research efforts and the practical application of findings by local innovation actors. By adopting these innovative funding approaches, future research can gain the necessary resources and flexibility to tackle these pressing issues effectively**.

Investigating the implications of mission-oriented innovation for diverse places is another crucial area for research. This approach, which focuses on addressing specific societal challenges through coordinated innovation efforts, may have varying impacts and requirements across different regional contexts. Understanding how mission-oriented innovation can be effectively implemented and adapted to support local innovation ecosystems in diverse geographical and socio-economic settings is vital for developing more targeted and impactful innovation policies**.**

In summary, addressing the key challenges, issues, and opportunities in local innovation policy requires a multifaceted approach that integrates diverse perspectives, employs rigorous methodologies, and fosters long-term, collaborative research efforts supported by innovative funding mechanisms. We propose a co-creation model involving funding bodies, researchers, policy institutions (including local governments), businesses, and community stakeholders to ensure that research efforts are aligned with practical needs and outcomes.

There should be a greater emphasis on the implementation of Research and Development (R&D) and Research and Innovation (R&I) support mechanisms. This approach should move beyond the traditional focus on Science, Technology, Engineering, and Mathematics (STEM) to incorporate Arts, Humanities, and Social Sciences (AHSS), fostering truly cross-disciplinary approaches. Such integration is crucial for addressing complex societal challenges and driving holistic innovation.

Additionally, successful place-based innovation strategies require complementary measures that extend beyond conventional innovation support. These include:
1. Promoting extra-regional collaborations to enhance knowledge exchange and broaden innovation networks
2. Addressing skills gaps through targeted education and training programmes
3. Improving infrastructure to support innovation activities
4. Building local capacity for innovation management and entrepreneurship

To ensure the effectiveness of these strategies, policymakers should focus on:
1. Coordinating a coherent policy mix that aligns various initiatives and stakeholder interests
2. Implementing robust monitoring and evaluation frameworks to assess impact and guide policy refinement

3. Developing local policy capacity to design, implement, and adapt innovation strategies to specific regional contexts

By adopting this comprehensive approach, regions can create more resilient, inclusive, and dynamic innovation ecosystems that are responsive to local needs and global opportunities.

References

1. Appelt S, Galindo-Rueda F, González Cabral AC. R&D Tax Incentives: Evidence on design, incidence and impacts. OECD Science, Technology and Industry Policy Papers. 2016;32.

2. Azoulay P, Ding W, Stuart T. The Effect of Academic Patenting on the Rate, Quality, and Direction of (Public) Research Output. Journal of Industrial Economics. 2009;57:637–676.

3. Azoulay P, Graff Zivin JS, Li D, Sampat BN. Public R&D Investments and Private-Sector Patenting: Evidence from NIH Funding Rules. Review of Economic Studies. 2019;86(1):117-152.

4. Barbier EB. Greening the Post-pandemic Recovery in the G20. Environmental & Resource Economics. 2020;76(4):685-703.

5. Barbier EB. Is green rural transformation possible in developing countries? World Development. 2020;131:12.

6. Bloom N, Schankerman M, Van Reenen J. Identifying technology product market rivalry. Econometrica. 2013;81:1347–1393.

7. Bloom N, Van Reenen J, Williams H. A Toolkit of Policies to Promote Innovation. Journal of Economic Perspectives. 2019;33(3):163–184.

8. Bruce JR, de Figueiredo JM. Innovation in the U.S. Government. National Bureau of Economic Research Working Papers. 2020;27181.

9. Connell D. Is the UK's flagship industrial policy a costly failure? An Independent Reappraisal of the Objectives, Theory, Practice and Impact of the UK's £7.3 Billion a Year R&D Tax Credits and £1.1 Billion a Year Patent Box Schemes. Cambridge: Centre for Business Research; 2021.

10. CPB. Do innovation vouchers help SMEs to cross the bridge towards science? [Internet]. 2006 [cited 2024 Jul 11]. Available from: https://www.cpb.nl/en/publication/do-innovation-vouchers-help-smes-cross-bridge-towards-science

11. Czarnitzki D, Rammer C, Toole AA. University spin-offs and the "performance premium". Small Business Economics. 2014;43(2):309-326.

12. Doern GB, Stoney C. Federal research and innovation policies and Canadian universities: A framework for analysis. Research and Innovation Policy: Changing Federal Government-University Relations. 2009:3-34.

13. Department for Business, Energy & Industrial Strategy. UK Research and Development Roadmap [Internet]. GOV.UK. 2020 [cited 2024 Jul 11]. Available from: https://www.gov.uk/government/publications/uk-research-and-development-roadmap

14. Department for Science, Innovation and Technology. Making Innovation Matter: how the UK can benefit from spreading and using innovative ideas [Internet]. 2023 [cited 2024 Jul 11]. Available from: https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1142650/making-innovation-matter-how-the-uk-can-benefit-from-spreading-and-using-innovative-ideas.pdf

15. Department for Science, Innovation and Technology. Identifying and describing UK innovation clusters [Internet]. 2024 [cited 2024 Jul 11]. Available from: https://publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1142651/identifying-and-describing-uk-innovation-clusters.pdf

16. Department for Science, Innovation and Technology. United Kingdom innovation survey 2023: report [Internet]. GOV.UK. 2023 [cited 2024 Jul 11]. Available from:

https://www.gov.uk/government/statistics/uk-innovation-survey-2023-report/united-kingdom-innovation-survey-2023-report

17. Economic and Social Research Council. ESRC Strategic Delivery Plan 2022–2025 [Internet]. UKRI. 2022 [cited 2024 Jul 11]. Available from: https://www.ukri.org/publications/esrc-strategic-delivery-plan/esrc-strategic-delivery-plan-2022-2025/

18. Economic Insight. What is the relationship between public and private investment in science, research and innovation. A report commissioned by the Department for Business, Innovation and Skills. 2015.

19. Enterprise M3. Local Industrial Strategy Evidence Base [Internet]. [cited 2024 Jul 11]. Available from: https://www.enterprisem3.org.uk/local-industrial-strategy-evidence-base

20. Enterprise Research Centre. Benchmarking Local Innovation: The Innovation Geography of England 2016-18 [Internet]. 2021 [cited 2024 Jul 11]. Available from: https://www.enterpriseresearch.ac.uk/wp-content/uploads/2021/05/ERC-Report-Benchmarking-Innovation-Final-2021.pdf

21. Enterprise Research Centre. Powering Science-based innovation: Exploring the need and role of a Network of Innovation Centres in the UK and Ireland [Internet]. 2023 [cited 2024 Jul 11]. Available from: https://www.enterpriseresearch.ac.uk/publications/powering-science-based-innovation-exploring-the-need-and-role-of-a-network-of-innovation-centres-in-the-uk-and-ireland/

22. Forth J, Jones G. The missing £4 billion: Making R&D work for the whole UK [Internet]. Nesta; 2020 [cited 2024 Jul 11]. Available from: https://www.nesta.org.uk/report/the-missing-4-billion/

23. Ford C. Innovation-Framing Regulation. Annals of the American Academy of Political and Social Science. 2013;649:76-97.

24. Greater London Authority. The Evidence Base for London's Local Industrial Strategy – Final report [Internet]. 2020 [cited 2024 Jul 11]. Available from: https://www.london.gov.uk/sites/default/files/lis-evidence-base-final.pdf

25. Gök A. The impact of innovation inducement prizes. In: Handbook of Innovation Policy Impact. Edward Elgar Publishing; 2016. p. 403-422.

26. Guellec D, van Pottelsberghe de la Potterie B. The impact of public R&D expenditure on business R&D. Economics of Innovation and New Technology. 2003;12(3):225-243.

27. Hausman N. University innovation and local economic growth. The Review of Economics and Statistics. 2022;10(4):718-735.

28. Hayter CS. Harnessing University Entrepreneurship for Economic Growth: Factors of Success Among University Spin-offs. Economic Development Quarterly. 2013;27(1):18-28.

29. Henderson R, Jaffe A, Trajtenberg M. Universities as a Source of Commercial Technology: A Detailed Analysis of University Patenting 1965–1988. Review of Economics and Statistics. 1998;80:119–127.

30. Horlings LG. Leadership, governance and place in the knowledge economy: the case of Brainport Eindhoven in the Netherlands. In: Paper for the Regional Studies Association European Conference. 2013.

31. Howell ST. Financing Innovation: Evidence from R&D Grants. American Economic Review. 2017;107(4):1136-1164.

32. Humphreys K, Kollydas K. The importance of good R&D data and current challenges [Internet]. City-REDI Blog. 2024 [cited 2024 Jul 11]. Available from: https://blog.bham.ac.uk/cityredi/the-importance-of-good-rd-data-and-current-challenges/

33. Institute for Government. The precarious state of the state: Devolution [Internet]. 2024 Jan 19 [cited 2024 Jul 11]. Available from: https://www.instituteforgovernment.org.uk/publication/general-election-2024-precarious-state/devolution

34. Innovation Growth Lab. IGL Trials Database [Internet]. [cited 2024 Jul 11]. Available from: https://www.innovationgrowthlab.org/igl-trials-database?page=1

35. Innovation Growth Lab. A good year for experimentation in R&I policy [Internet]. [cited 2024 Jul 11]. Available from: https://www.innovationgrowthlab.org/blog/good-year-experimentation-ri-policy

36. Innovation Growth Lab. Rethinking Innovation Spaces [Internet]. [cited 2024 Jul 11]. Available from: https://www.innovationgrowthlab.org/blog/rethinking-innovation-spaces

37. Innovation Growth Lab. Subsidized R&D Collaboration: The Causal Effect of Innovation Vouchers on Innovation Performance [Internet]. 2020 [cited 2024 Jul 11]. Available from: https://www.innovationgrowthlab.org/sites/default/files/IGL%20Working%20Paper%2020.4.pdf

38. Innovation Research Caucus. Home [Internet]. Innovation Research Caucus. [cited 2024 Jul 11]. Available from: https://www.ircaucus.ac.uk/

39. Iacobucci D, Micozzi A. How to evaluate the impact of academic spin-offs on local development: an empirical analysis of the Italian case. The Journal of Technology Transfer. 2015;40:434-452.

40. Innovation Caucus. Understanding Cluster Growth Potential [Internet]. 2022 [cited 2024 Jul 11]. Available from: https://innovationcaucus.co.uk/2022/06/13/understanding-cluster-growth-potential/

41. JTC. About | Jurong Innovation District [Internet]. 2024 [cited 2024 Jul 11]. Available from: jtc.gov.sg

42. Kim T, Nguyen QH. The Effect of Public Spending on Private Investment. Review of Finance. 2020;24(2):415-451.

43. Kleine M, Heite J, Huber LR. Subsidized R&D collaboration: The causal effect of innovation vouchers on innovation outcomes. Research Policy. 2022;51(6):104515.

44. Lee N. Inclusive innovation in cities: from buzzword to policy. Regional Studies. 2023:1-12.

45. Leicht KT, Jenkins JC. State investments in high-technology job growth. Social Science Research. 2017;65:30-46.

46. Martin BR. R&D policy instruments – a critical review of what we do and don't know. Industry and Innovation. 2016;23(2):157-176.

47. Mazzucato M. The entrepreneurial state. Soundings. 2011;49:132-142.

48. Mazzucato M. Mission-oriented innovation policies: challenges and opportunities. Industrial and Corporate Change. 2018;27(5):803-815.

49. Mowery DC, Nelson RR, Sampat BN. Ivory Tower and Industrial Innovation. University-Industry Technology Transfer Before and After the Bayh-Dole Act. Palo Alto, CA: Stanford University Press; 2004.

50. Mustar P, Wright M, Clarysse B. University spin-off firms: lessons from ten years of experience in Europe. Science and Public Policy. 2008;32(2):67-80.

51. Nelles J, Vallance P, Vorley T, Wallace P. Understanding Cluster Growth Potential [Internet]. Innovation Caucus; 2022 [cited 2024 Jul 11]. Available from: https://innovationcaucus.co.uk/app/uploads/2022/06/ClusterReport_Final.pdf

52. Nemet GF, Zipperer V, Kraus M. The valley of death, the technology pork barrel, and public support for large demonstration projects. Energy Policy. 2018;119:154-167.

53. NESTA. A compendium of innovation methods [Internet]. Nesta. 2019 Mar [cited 2024 Jul 11]. Available from: https://www.nesta.org.uk/report/compendium-innovation-methods/

54. NESTA. The Impact and Effectiveness of Entrepreneurship Policy [Internet]. [cited 2024 Jul 11]. Available from: https://media.nesta.org.uk/documents/the_impact_and_effectiveness_of_entrepreneurship.pdf

55. Okamuro H, Nishimura J. Impact of university intellectual property policy on the performance of university-industry research collaboration. The Journal of Technology Transfer. 2012;38:273-301.

56. Okamuro H, Nishimura J. Whose business is your project? A comparative study of different subsidy policy schemes for collaborative R&D. Technological Forecasting and Social Change. 2018;127:85-96.

57. OECD. Science, Technology and Innovation Policy for Sustainability Transitions [Internet]. 2023 [cited 2024 Jul 11]. Available from: https://www.oecd-ilibrary.org/sites/c06f0b83-en/index.html?itemId=/content/component/c06f0b83-en

58. Oxford Economics. The relationship between public and private R&D funding [Internet]. 2020 [cited 2024 Jul 11]. Available from: https://www.oxfordeconomics.com/resource/the-relationship-between-public-and-private-rd-funding/

59. Smart Cities Dive. Case Study: 22@ Barcelona Innovation District [Internet]. 2017 [cited 2024 Jul 11]. Available from: Smart Cities Dive

60. Straughter J, Carley K. Towards a network theory of regulatory burden. Applied Network Science. 2021;6(1):1-12.

61. Squicciarini M. Science Parks' tenants versus out-of-Park firms: who innovates more? A duration model. Journal of Technology Transfer. 2008;33:45-71.

62. Stanley I, Glennie A, Gabriel M. How inclusive is innovation policy? Insights from an international comparison [Internet]. Nesta. 2018 Nov [cited 2024 Jul 11]. Available from: https://www.nesta.org.uk/report/how-inclusive-is-innovation-policy-insights-from-an-international-comparison/

63. Popp D. From science to technology: The value of knowledge from different energy research institutions. Research Policy. 2017;46(9):1580-1594.

64. Rehman NU, Hysa E, Mao X. Does public R&D complement or crowd-out private R&D in pre and post economic crisis of 2008? Journal of Applied Economics. 2020;23(1):349-371.

65. Roelandt T, Van der Wiel H. The long-term impact of Dutch innovation vouchers: back to the future with randomised controlled trials [Internet]. Innovation Growth Lab; 2020 [cited 2024 Jul 11]. Available from: https://www.innovationgrowthlab.org/blog/long-term-impact-dutch-innovation-vouchers-back-future-randomised-controlled-trials

66. Teichgraeber A, Van Reenen J. A policy toolkit to increase research and innovation in the European Union. London: Centre for Economic Performance; 2022.

67. TheCityUK. Enabling growth across the UK 2023: UK-based financial and related professional services [Internet]. 2023 [cited 2024 Jul 11]. Available from: https://www.thecityuk.com/media/qr2hecul/enabling-growth-across-the-uk-2023.pdf

68. UK Innovation Districts Group. Home [Internet]. UK Innovation Districts Group. [cited 2024 Jul 11]. Available from: https://www.ukinnovationdistricts.co.uk/

69. UK Research and Innovation. Strength in Places Fund [Internet]. UKRI. [cited 2024 Jul 11]. Available from: https://www.ukri.org/apply-for-funding/funding-programmes/strength-in-places-fund/

70. Uyarra E, Moñux D, Li Y, Esteban A, Rigby J, Ospina MJ, et al. Spurring innovation-led growth in Latin America and the Caribbean through public procurement. 2016.

71. Uyarra, E., Edler, J., Garcia-Estevez, J., Georghiou, L., & Yeow, J. (2014). Barriers to innovation through public procurement: A supplier perspective. Technovation, 34(10), 631-645.

72. Uyarra E, Flanagan K, Wanzenböck I. The spatial and scalar implications of missions: Challenges and opportunities for policy [Internet]. Manchester: Manchester Institute of Innovation Research; 2023 [cited 2024 Oct 1]. Available from: https://pure.manchester.ac.uk/ws/portalfiles/portal/263803125/mioir.wp.2023_04.pdf Wang L, Morabito M, Payne CT, Robinson G. Identifying Institutional Barriers and Policy Implications for Sustainable Energy Technology Adoption among Large Organizations in California. Energy Policy. 2020;146.

73. What Works Growth. Evidence topic: Innovation [Internet]. [cited 2024 Jul 11]. Available from: https://whatworksgrowth.org/policy-areas/innovation/

74. Zivin JSG, Lyons E. Can innovators be created? Experimental evidence from an innovation contest. National Bureau of Economic Research Working Paper. 2018;24339.

Find out more:

The Local Policy Innovation Partnership Hub is funded by:

Members of the Local Policy Innovation Partnership Hub Delivery Team: