CaSE
Campaign for Science and Engineering

Supported by LifeArc

Backing Business R&D

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Incentivising continued investment in UK innovation

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Forewords

Stéphane Maikovsky, Interim CEO, LifeArc

At LifeArc our mission is to make life science life changing. To do that, we need every part of the R&D ecosystem to succeed – not just our part of the pipeline to patients, and not just our sector. When you look at the whole system this way, you can't escape the necessity of business investment. Businesses fund nearly three-quarters of the UK's R&D in total. So even if you work in the not-for-profit sector, it's almost guaranteed that at some point, in some way, private funding is helping your work progress and have an impact. Ultimately, business is everyone's business.

That's why LifeArc sponsored this report by CaSE. As the prospect of a new UK government looms, it is important to ask whether the fundamentals of our R&D ecosystem are working as they should. Whether it's the availability of infrastructure, the offer of financial incentives, or the ability of regional clusters to market themselves to investors, we should be pulling on all the levers available to make the UK an easy and exciting place to invest in R&D.

This is the right conversation to be having, at the right time. Therefore, I hope you will engage with this report and work with CaSE, LifeArc, and the rest of the R&D community to ensure the UK really does become a go-to destination for companies looking to invest in R&D.

Dr Daniel Rathbone, Deputy Executive Director, Campaign for Science and Engineering (CaSE)

In recent years the UK Government has made repeated and welcome commitments to invest more in R&D. If we are to meet our ambitions to be more research intensive, and see wider growth in productivity in the UK, it is vital that private sector investment also continues to rise. To achieve this in a globally competitive climate, the UK must provide an attractive environment for businesses to invest more in R&D.

In this report, we consider actions the Government could take to support the rapid unlocking of barriers to business R&D investment, as well as measures that will strengthen the UK business R&D environment in the medium to long term.

We are hugely grateful to all those who have supported this work, including LifeArc, our expert Advisory Group, CaSE members, and the wider community. All of whom have helped inform our findings.

As a non-partisan organisation with a membership that cuts across R&D sectors, CaSE is uniquely positioned to take a high-level, cross sector view of the research and innovation environment, and give impartial expert insight on the whole R&D system to all stakeholders.

Contents

Executive Summary

Ensuring business research and development (R&D) investment continues to rise is vital if the UK is to achieve its research intensity ambitions.

This report sets out some of the barriers that UK businesses face when investing in R&D. It also sets out recommendations for the UK Government that will help build an attractive environment for R&D-led businesses, promoting business R&D investment and, in turn, a more research and innovation intensive economy. The report takes a broad approach, exploring areas within the research and innovation system that are relevant across a diverse range of sectors and business sizes.

In a globally competitive climate, the UK Government must use all the levers available to create and enable an environment that incentivises businesses to invest in R&D in the UK. This should happen within the context of a long-term, predictable and strategic framework.

We propose a series of actions and corresponding recommendations that:

Ensure the policy landscape is predictable and fit for purpose:

Many areas of the policy landscape are going in the right direction and have good support from R&D-led businesses. What is needed is a focus on ensuring these are as effective as possible, including that they are predictable, fit for purpose and their implementation adequately resourced.

Increase and improve support across different stages of research and innovation:

Other areas contain gaps in innovation support across different stages of the R&D and business development pipeline. What is needed is a focus on increasing and improving the landscape of support in the medium to long-term.

Leverage regional strengths in R&D:

There is scope to further strengthen local innovation ecosystems to improve R&D investment opportunities across the UK.

The report considers both actions that can support the rapid unlocking of current barriers to business R&D investment, as well as measures that will strengthen the UK business R&D environment in the medium to long term.

Short-term actions

These actions should be taken by the UK Government quickly to ensure that current policies are as effective as possible.

R&D tax credits

- Provide a statement of intent on the purpose and focus of R&D tax credits and stick to it.
- Revise the definition of R&D within tax credits to ensure it reflects the requirements of R&D-led businesses across new and emerging sectors.

Regulation

- Implement the recommendations of the Pro-Innovation Review of Technologies and Closing the Gap series.
- Use the expertise of cross-sector groups of external experts to support resourcing of regulatory capacity.

Funding and financial support

- Ensure the investment thresholds for the Enterprise Investment Scheme (EIS) and Seed Enterprise Investment Scheme (SEIS) are appropriate and regularly updated.
- Evaluate the implementation of the Science and Technology Venture Capital Fellowship.

Early-stage support

- Conduct a timely evaluation of the UK Research and Innovation (UKRI) proof-of-concept funding programme for supporting university spin-outs.
- Implement the recommendations of the Independent Review of University Spin-out Companies to strengthen and incentivise research commercialisation.

Support regions

- Give regions the freedom to make decisions about local innovation programmes.

Medium to long-term actions

These actions will increase and improve the landscape of support by helping to target gaps in innovation support in the medium to long term. They should be taken within the context of a long-term, predictable and strategic framework.

Funding and financial support

- Use the Mansion House reforms in close collaboration with R&D-led businesses to unlock pension funds for investment in R&D intensive industries.
- Increase and promote the number of funding opportunities for SME-university collaborations.
- Set long-term budgets for funding bodies and increase the flexibility of funding calls.

Public procurement

- Use public procurement to establish and strengthen markets for new technologies.
- Establish more flexible and adaptable public procurement pathways to support smaller businesses.

Standards

- Support the development of standards to drive the development and commercialisation of new and emerging technologies.

R&D infrastructure

- Prioritise and incentivise R&D facility development projects.
- Support R&D infrastructure through wider infrastructure improvements.

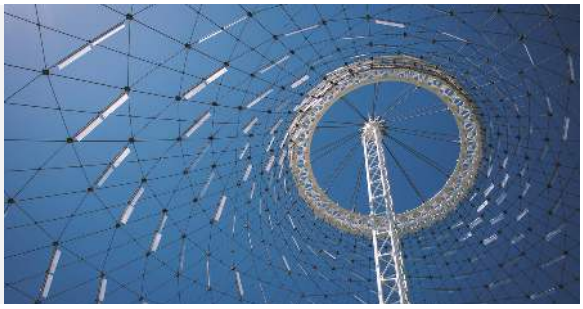
Knowledge exchange

- Promote, communicate and support existing collaborative opportunities for the business and academic sectors.

Regional R&D capacity and branding

- Align local education provision with changing employer skills requirements.
- Support regions to market their strengths and capabilities in order to attract inward investment.

Background and context



The ambition to make the UK a more research and innovation intensive economy is shared by political parties across Parliament. In recent years there have been repeated and welcome commitments by both Government and opposition parties to invest more in UK R&D, with £19.4 billion invested by the UK Government in 2023/2024 (1), which is very close to its commitment to spend £20 billion annually by 2024/25 (2).

R&D is essential to solving many challenges facing society. The benefits of R&D are felt across all areas of life in the UK, from boosting the economy to improving the quality of the NHS. The innovations that research supports will be crucial in tackling some of our most pressing global and national issues, a factor that is recognised by the UK public. In CaSE's 2022-2023 public opinion study a majority of respondents felt that new research is an essential or important part of solving societal challenges, such as climate change and energy security (3).

The value of R&D is recognised across the political spectrum, with plans to support R&D-intensive sectors laid out by both governing and opposition parties (4–7). In 2023, the Department for Science, Innovation and Technology (DSIT) published a Science and Technology Framework, which sets out how Government can drive a transformative shift in UK prosperity and wellbeing through science and technology (7).

Why business R&D investment?

In the UK, businesses are the main funders and performers of R&D; the amount of R&D performed by businesses was £46.9 billion in 2021, which represented 71% of all R&D conducted in the UK (8). R&D is a driver of productivity and growth, with innovation accounting for two-thirds of the UK's private sector labour productivity growth between 2000 and 2007 (9). Consequently, incentivising greater business R&D investment by the private sector is fundamental to growing the UK economy (10).

There is a strong case for Government intervention to support R&D across the economy, with analysis showing that public investment crowds in significant levels of private sector investment in R&D (10,11). While there have been welcome increases in public sector commitments to invest in R&D, ensuring business R&D investment continues to rise will be vital to achieving any UK research and innovation ambitions. Furthermore, to maximise the returns on public R&D investment, it is crucial that the UK policy environment has the measures needed to encourage further business investment.

Recent corrections to Office for National Statistics (ONS) data suggest that R&D carried out by the private sector has previously been underestimated, especially among small businesses (12). Despite this, the UK is still behind world leaders on R&D investment (13). The UK Innovation Report 2023 by Cambridge Industrial Innovation Policy found that few firms with headquarters in the UK are among the world's top R&D investors and patent applicants (14).

Moreover, the recently released Business Enterprise Research and Development (BERD) data for the UK in 2022 showed that, despite consistent annual cash increases in recent years, high inflation means business R&D investment in real terms has broadly stagnated since 2018 (Figure 1) (15).

Expenditure on R&D performed by UK businesses

Source: ONS Business enterprise research and development, UK: 2022
Figure 1. Timeline of expenditure on R&D performed by UK businesses from 2014-2022, in constant prices (2022)

Policy levers to support business R&D and innovation

In a globally competitive climate, the UK Government must deploy all its policy levers to provide an attractive and competitive environment for businesses if it wants them to invest more in R&D.

Supporting business R&D investment is an ongoing focus of the Government's research and innovation priorities, as set out in the Science and Technology Framework (7). The Science and Technology Framework recognises the leading role that private sector investment plays in delivering on its R&D intensity ambitions and acknowledges the importance of public sector investment in catalysing business expenditure on R&D. This sentiment has also been reflected in the recent plans and priorities set forth by opposition parties (4,5).

Alongside these strategies, the UK Government has commissioned numerous independent reviews that have been conducted in recent years identifying the challenges and opportunities in the landscape of UK R&D. These include the review of the research, development and innovation organisational landscape by Sir Paul Nurse (16) and the Independent Review of University Spin-out Companies (17).

In addition to public R&D investment, other important aspects of the UK's innovation ecosystem include infrastructure, markets, regulation, procurement, developing skills and focusing on regional strengths, amongst others. The UK Government has a crucial role to play in using all the levers available to build the best possible environment to ensure public investment leverages private investment in R&D. The challenge is to understand what further initiatives may be needed, as well as how the existing framework can be made to work better to achieve the required scale.

Approach and scope of the work

This report sets out some of the barriers that UK businesses face when investing in R&D. It also sets out recommendations for the UK Government that will help build an attractive environment for R&D intensive businesses, promoting business R&D investment and, in turn, a more research and innovation intensive economy. The recommendations in this report are largely applicable to the UK Government. Where recommendations relate to local economic and infrastructure development policy, there is an additional role for devolved and local governments to play, ensuring that improvements are made across the UK.

The recommendations consider both actions that support the rapid unlocking of current barriers to business R&D investment, as well as measures that will strengthen the UK business R&D environment in the longer term.

The factors influencing the environment for business R&D are wide in scope. This report takes a broad approach, exploring themes relevant across a diverse range of sectors and business sizes. A series of roundtables explored specific areas of the landscape for business R&D where there are challenges and bottlenecks that need alleviating.

The report also draws together valuable insights from work done by other stakeholders, including independent reviews and reports published by the R&D sector, and builds on CaSE's previous work, including on the crucial role of skills provision in supporting UK R&D (18). We have considered these perspectives alongside our recent discussions with the sector when integrating key evidence on the barriers to business R&D investment and drawing out cross-cutting recommendations.

Where appropriate, we have highlighted any long-standing, unaddressed recommendations and explored what factors may be blocking progress, as well as identified areas where promising policy changes have been announced and now need greater implementation support.

The conclusions and recommendations laid out in this report are based on views gathered through an extensive consultation process conducted over the last six months. Evidence has been gathered from the breadth of CaSE's membership, including businesses, universities, charities and learned and professional societies, as well as wider stakeholders.

The expertise and perspectives of CaSE's members have been crucial in building a representative view across the R&D sector and throughout the UK, allowing us to identify challenges and solutions spanning the business R&D landscape. For a list of contributors see the end of this report. We gathered evidence using the following methods:

- Desk research of existing reports conducted by the sector, commissioned reviews and any relevant departmental press releases, policy papers and reports.

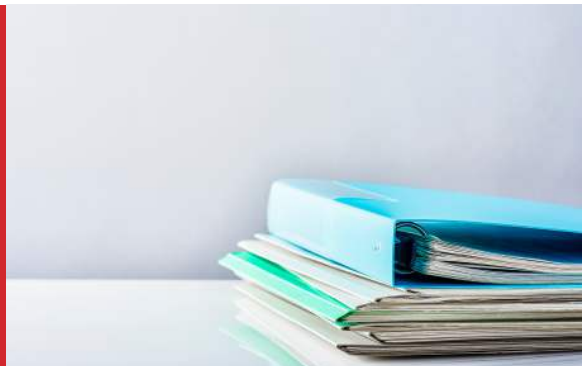
- Four roundtables covering the following areas influencing business R&D investment: Research and innovation infrastructure; financial support and incentives; regulatory landscape; and leveraging regional strengths. Write-ups of all our round tables can be found at: https://www.sciencecampaign.org.uk/analysis-and-publications/detail/building-a-better-environment-for-business-rd/

- Interviews with universities, learned societies and professional bodies, businesses and other stakeholders to bring in additional perspectives on sector and business size, along with regional considerations.

The following chapters are structured around three actions that address cross-cutting challenges relevant across the UK's business R&D landscape: (i) Ensure the policy landscape is predictable and fit for purpose; (ii) Increase and improve support across different stages of R&D; and (iii) Leverage regional strengths in R&D. Under each chapter, the sections are framed around actions, with corresponding recommendations.

While the work considered specific areas influencing business investment in R&D, the conclusions aim to highlight a series of shared challenges across the sector. In doing so, this work seeks to emphasise the importance of an integrated approach to improving the UK environment for business R&D and to ensure policy reform across these different areas is coordinated and aligned.

Ensure the policy landscape is predictable and fit for purpose



A stable and predictable policy environment is vital to enable effective long-term planning and investment by businesses in R&D. This is crucial for all R&D-intensive companies and particularly important for deep-tech companies, whose timeframes for commercialisation can be especially long.

While some flexibility is needed to allow for periodic updates to policy to ensure it remains fit for purpose, what matters for businesses is predictability through clear signalling of intent and direction of travel. Our discussions noted that government focus on priority areas can provide stability and certainty for businesses to invest.

An example was given from the quantum sector, which has been backed by a 10-year strategy and funding announced in 2023. This has provided longer-term certainty to quantum businesses in the UK that there will be continued support for commercialisation. In another example, the Life Sciences Vision contains missions in areas in which the UK wants to be a global leader, which provides a helpful focus point to engage businesses. The importance of a consistent and long-term policy strategy has also been highlighted by the recent Harrington Review of Foreign Direct Investment (19).

The current policy landscape for business R&D presents a mixed picture. Many areas are perceived to be going in the right direction, and have good support from the sector, but are faced with instability and lack of clarity, or are held back by design and implementation issues.

While R&D investment commitments from the UK Government are welcome and a good step in providing businesses with the certainty they need to invest, there has been instability and lack of predictability in several specific areas of policy. These include financial support, regulation and public procurement. Although some promising and well-received policy measures have been announced in these areas, there are examples where insufficient resources and expertise are hindering implementation.

In addition, over the last year the UK immigration and visa system has seen changes that have increased upfront costs and restricted eligibility criteria for overseas workers and their dependents (20). These changes could make the UK a less attractive destination for researchers and make it more difficult for businesses to recruit the talent they need. Access to the best talent, including international talent, is an important consideration for businesses looking to scale and grow.

R&D tax credits

Provide clarity on the purpose and focus of R&D tax credits

R&D tax credits, in operation since 2000, have played a crucial role in encouraging investment in R&D by UK businesses. An important reason they have been successful over time is because of their stability and predictability.

However, recent successive policy changes to R&D tax credits, including the level at which they are set, has led to a lack of clarity and certainty for businesses. While the most recent announcements on R&D tax credits in the 2023 Autumn Statement and Finance Bill are viewed as a step in the right direction (21–23), our discussions revealed that these are perceived to be damage limitation – to remedy previous changes over the last two years - and that the changes reflect a poor understanding of how tax credits impact businesses in different sectors. To avoid continued misunderstanding in future, there needs to be a statement of intent from the Government on the purpose and focus of R&D tax reliefs.

Recommendation

Provide a statement of intent on the purpose and focus of R&D tax credits and stick to it. This should include clarifying the level at which they are set to provide certainty for businesses.

Modernise the definition of R&D within tax credits to ensure it is fit for purpose

Our discussions showed that the implementation of R&D tax credits, including definitions around what constitutes R&D, is hampered by a lack of sector-specific expertise within the Treasury and HMRC. Furthermore, the definition of R&D for tax relief purposes is struggling to keep pace with developments in new and emerging technology, such as advanced computational R&D (24), as well as with the intersection of technologies.

At present there is little formal guidance on the application of the definition of R&D to different sectors, which leads to uncertainty for businesses. It is therefore welcome to see it announced in the 2024 Spring Budget that HMRC will establish an expert advisory panel to support the administration of R&D reliefs and improve the functioning of the R&D tax reliefs system (25). In addition, using adequate and up to date definitions of R&D would help to give businesses predictability.

Recommendation

Revise the definition of R&D within tax credits to ensure it reflects the requirements of R&D-led businesses across new and emerging sectors. This should include revising the definition and providing clear guidance on its application, including updating the examples that are featured. Any revisions to the definition need to be clearly communicated in advance and sit within the clearly defined statement of intent.

Regulation

A stable, predictable and forward-looking regulatory and policy environment sends a powerful signal to businesses and investors about the attractiveness of the UK environment. From an investor perspective, whether a sector is lightly or heavily regulated can be an advantage or a disadvantage, respectively. Where the regulatory system is perceived to be restrictive by investors, this can lead to a first mover disadvantage. In contrast, sectors with less regulation may provide a first mover advantage. There must, therefore, be a balance between not stifling first mover advantage while having sufficient regulatory oversight.

In several sectors, the UK regulatory system is already innovative and creative. Regulatory sandboxes are an example of this (22,23), with the Financial Conduct Authority and Information Commissioner's Office in particular offering successful sandboxes.

The UK Government has recognised the importance of adaptive regulation like this to support innovation, including in the Science and Technology Framework, the Pro-innovation Regulation of Technologies Review and the Regulatory Horizon Council's Closing the Gap series of reports, which make recommendations for how the UK can better regulate emerging technologies in critical sectors (26).

Taken together, these provide good principles on what is needed to improve the regulatory landscape across sectors. What is needed now is delivery and implementation, which will require central coordination by, for example, the Regulatory Horizons Council, across multiple organisations, particularly when recommendations cut across sectors.

Support regulatory capacity

Our discussions emphasised that an area that requires urgent attention is how regulators are resourced to carry out their functions. Challenges around regulatory capacity have been further compounded by the UK leaving the European Union, which has led to additional workflow for regulators across multiple sectors. Lack of regulatory capacity can lead to costly delays for businesses, which is a particular issue for small and medium sized businesses (SMEs). It could also have an impact on business confidence in the UK regulatory environment.

Some existing aspects of the UK regulatory landscape are a strength; for example, the swiftness and flexibility with which the Medicines and Healthcare Products Agency (MHRA) has demonstrated it can operate. These qualities were cited as an incentive for businesses to conduct clinical trials in the UK, but this efficiency has declined recently. The MHRA must be fully resourced if the UK is to take advantage of this incentive.

Using external expertise and capitalising on existing structures, such as business schools in the university sector or cross-sector groups made up of academics or industry experts could complement regulatory teams. External experts are well placed to diagnose the health of their own sectors and propose solutions. For example, the Centre for Regulatory Science and Innovation (CRSI) network at the University of Birmingham is an example of such a network that is thinking about innovating safely and responsibly.

Supporting regulatory capacity will require adequate funding from the Government, particularly in cases where regulators cannot raise their own revenues. Providing investment to increase regulatory capacity was one of the recommendations of the Regulatory Horizons Council in its report on medical devices (27).

Recommendations

Implement the recommendations of the Pro-Innovation Review of Technologies and Closing the Gap series. As set out in these reviews, system-level changes need to be introduced to support technological innovation. This will require cross-sector expertise and effective coordination by the Regulatory Horizons Council across multiple organisations. The Government will need to provide adequate funding to resource this.

Use the expertise of cross-sector groups of external experts to support resourcing of regulatory capacity. This could be via leveraging the expertise of business schools in the university sector or cross-sector groups made up of academics or industry experts to complement regulatory teams.

Use standards to address regulatory uncertainty for new and emerging technologies

Businesses developing new and emerging technologies can find it challenging to meet the requirements of the regulatory system. This is because it can be hard for a business to know how a new or emerging technology will evolve.

In addition, the intersection of technologies, for example artificial intelligence (AI) with life sciences, makes it particularly difficult to meet the requirements of the regulatory system. Regulators themselves often do not know how a new technology would fit within existing regulatory requirements, since a new and emerging technology is ahead of what a regulator has seen before.

Consequently, these regulatory gaps and uncertainty can be challenging for both businesses and investors to navigate. Multiple reports have identified the need for regulatory policy to be flexible to respond to this uncertainty (21,22,23,28,29).

Standards could provide a mechanism for the governance of emerging technologies and sectors, by providing a framework and guidance that leads to more proportionate regulation further down the line. Standards for new and emerging technologies should be developed in collaboration with stakeholders working in that area, who should be provided with support to enable them to engage in the process.

For example, the UK Quantum Standards Network Pilot (a collaboration between the National Physical Laboratory, the British Standards Institution (BSI), DSIT, UKQuantum, the National Cyber Security Centre and the National Quantum Computing Centre) aims to support the direct involvement of stakeholders in quantum technologies in the development of standards (30).

In another example, the Standards Challenge Fund, a collaboration between the BSI and Innovate UK, has called SMEs to submit ideas for new standards to support innovation in net zero, digital and healthy living. There is also increasing recognition of the importance of developing international standards for regulating nascent technologies, such as supporting AI security best practice (31).

Recommendation

Support the development of standards to drive the development and commercialisation of new and emerging technologies. Standards can help provide an initial framework and guidance, which can then lead to more proportionate regulation further down the line. The Government, together with the BSI, should extend collaborative networks to develop standards across multiple sectors.

Public procurement

Better leverage public procurement for public bodies to act as early adopters of innovation

Public procurement can be a powerful vehicle to drive innovation. Procurement normally accounts for about a third of public sector spending, and in 2022-23 the UK Government spent £393 billion procuring goods and services (32). Adopting innovation through public procurement provides wide ranging benefits to the public sector, enabling the delivery of improved products, processes, and services.

The UK Government should establish itself as an adopter of innovation early in the R&D translation pathway to de-risk private investment. Our discussions noted that the Government tends to signal its interest quite late compared to other countries' governments.

For example, despite publishing a 10-year strategy for quantum in 2023, the UK Government has not yet signalled its intent to procure a quantum computer. In contrast, in 2022 the German government's Aerospace Centre (DLR) invested €67 million in Universal Quantum, a University of Sussex spin-out, to build a scalable trapped ion quantum computer. Similarly, there are examples where the UK's procurement model falls behind comparator countries' approaches for certain industries, such as the single, centralised Polish procurement strategy for the defence industry (33).

Furthermore, our evidence shows that procurement strategies continue to be insufficient to support a thriving R&D business environment. In particular, a culture of risk aversion and the focus of procurement policy on achieving the lowest cost or narrowly defined value for money can hinder access to innovative solutions (34).

These constraints within procurement processes can present a barrier for R&D intensive businesses that do not operate in established markets, and may deter businesses from applying in the first place, therefore risking public procurement being closed off to new ideas and approaches (21,35).

While value for money and cost are, of course, important considerations when spending public money, consideration should also be given to delivering improved services over time through innovative developments. Our evidence suggested that a solution could be to create a procurement process for early-stage, R&D intensive businesses, which recognises that some businesses will be unable to meet certain competition requirements within existing processes, because they are pioneering and earlier stage than more established competitors.

Other checks could be done on this category of business, which recognises their unique situation and encourages more innovative businesses to participate in the procurement process, while considering value for money for the taxpayer.

There is significant scope for the Government to better leverage public procurement to de-risk the translation pathway and create confidence among investors. This has been recognised by the UK Government in its reforms to the public procurement regime, which received Royal Assent in 2023 (36). The Transforming Public Procurement programme aims to enable public bodies to procure more innovative solutions to improve the quality and efficiency of public services. As these changes will not come into effect until late 2024, it is too early to assess the effectiveness of the reforms in supporting business R&D.

Recommendations

Use public procurement to establish and strengthen markets for new technologies. Clear signalling of Government intent to act as early adopter through public procurement will enable businesses to develop strong route to market strategies, increasing the confidence of sectors to invest in targeted R&D. This requires strong leadership to promote cultural change in attitudes to risk and trade-offs in opening up public procurement to a more diverse supply base.

Establish more flexible and adaptable procurement pathways to support smaller businesses. Introduce a procurement process for early-stage, research-intensive businesses with an alternative system of checks that reflect their unique situation as pioneers operating in unestablished markets.

Increase and improve support across different stages of research and innovation

There are gaps in innovation support across different stages of the R&D translation and business development pipeline. Support for businesses at the scale-up stage was reported to be a particular issue across several areas, including funding and finance and infrastructure. The Harrington Review identified that this will require a general cultural shift within UK Government systems to support a more entrepreneurial attitude and a greater risk appetite (19).

The Government has recently announced a series of small-scale, pilot schemes that aim to address gaps in support. While these are welcome developments, it will be important to ensure they are implemented in close collaboration with the R&D-led businesses and evaluated in a timely manner.

Funding and financial support

Terms	
Seed funding	The first official equity funding stage for a new company. It typically represents the first official money a business venture or enterprise raises.
Series A funding	First round of funding following seed-funding when a company has shown progress in building its business model and demonstrated potential to grow and generate revenue.
Series B funding	Second round of funding to take businesses past the development stage and support company growth to meet market demand
Start-up	A nascent company developing an innovative new product or service, founded by entrepreneurs and generally operating under uncertain financial conditions.
Scale-up	A successful start-up that has matured into a fast-growing company (team growth of more than 20% per year over 3 consecutive years) with an established and profitable product or service.

Provide better financial support for scale-ups

The ability to access the right type of finance at each stage of development is critical to enable R&D focussed businesses to scale and grow. The landscape of financial support includes innovation grants, R&D funding programmes, R&D tax incentives, private equity and venture capital investment.

The Investor Partnership Programme run by Innovate UK, which aims to provide funding for SMEs to help them grow and scale, was highlighted as a successful example, with participants noting that it benefits from a fast process and has had good impact so far.

The Innovation-to-Commercialisation of University Research (ICURe) programme run by Innovate UK was also highlighted as a successful example of an early-stage research accelerator programme. It is designed to help researchers explore the commercial application and potential of their research. It also provides investors with an insight into early-stage research and helps them better understand its potential.

A lack of sustained financial support across the research and innovation pipeline has often been identified as a barrier to business R&D investment (14,21,22,23,29,37,38). Our evidence showed that financial support for scale-up businesses is a particular issue. Medium sized R&D-led businesses, which form a large part of business-driven R&D activity in the UK, often lack the necessary support. Series B funding was reported to be a significant challenge in the UK – while there are many funding pots, these are often not large enough.

There are also sector-specific challenges, for example for deep-tech companies there are often no 'price setters' who know how to value a deep-tech company post-Series A funding. The lack of financial support at these stages of development means that the UK often fails to keep many medium sized businesses. It is therefore positive to see that Michelle Donelan, the Secretary of State for Science, Innovation and Technology, has made scale-ups one of her priorities (39).

A related challenge is the investment thresholds for UK Government venture capital schemes. There are three schemes, Enterprise Investment Scheme (EIS), Seed Enterprise Investment Scheme (SEIS), and Venture Capital Trust (VCT), that are designed to encourage investment in higher-risk, early-stage innovative businesses.

The amounts that VCTs can invest using the schemes are based on thresholds that can limit the amounts available within Series B rounds of funding for businesses. Although the schemes provide a good incentive, in practice there is a need to update the thresholds regularly to ensure they remain relevant to the current investment landscape.

The scale-up funding gap has been raised consistently in recent years, alongside recommendations for tackling it (21,23,37,40,41). It is evident that a strong and renewed focus on addressing this shortfall is needed from the UK Government if the country is to achieve its R&D intensity ambitions.

Scale-up funding is one area where the 2023 Mansion House pension reforms could have a significant impact (42). The reforms aim to channel more investment from pension funds into high-growth UK businesses. Policy changes in this area should be implemented in close collaboration with the R&D sector to ensure that they have the required effect.

In addition, our discussions emphasised that support should also include fostering improved knowledge exchange between R&D-led businesses and investors to overcome cultural differences (43). It is therefore positive to see the Government's recent announcement of the Science and Technology Venture Capital Fellowship programme to support investment professionals with an interest in science and technology (44).

Recommendations

Use the Mansion House reforms to unlock pension funds for investment in R&D intensive industries. This should be conducted in close collaboration with R&D-led businesses to ensure that investments are maximally leveraged and have the required effect.

Evaluate the implementation of the Science and Technology Venture Capital Fellowship. The UK Government should conduct an evaluation alongside the implementation of the newly announced Science and Technology Venture Capital Fellowship pilot programme and, if deemed successful, expand it into a full-scale programme.

Ensure the investment thresholds for the Enterprise Investment Scheme (EIS) and Seed Enterprise Investment Scheme (SEIS) are appropriate and regularly updated. The thresholds should be regularly reviewed and updated to ensure they remain relevant to the current investment landscape.

Increase the flexibility of funding calls

The narrow window of funding calls is also a challenge to businesses. Short time frames between the announcement of funding opportunities and the closing date for submissions can be prohibitive not only for larger scale companies conducting R&D, where internal approval processes cannot keep pace, but also for collaborations and co-funding applications by multiple companies. These barriers risk excluding the expertise larger companies provide, including in advising on novel products and guiding how innovations fit into the existing ecosystems.

This lack of flexibility in funding opportunities is a longstanding issue (21,37,45) and, unless addressed, risks the UK failing to leverage the full economic benefits of business R&D. For example, the Innovate UK Smart Grants programme, which supports SMEs to scale-up and commercialise innovative R&D projects, runs regular funding competitions yet these opportunities are not set out in advance in a clear fixed annual calendar.

A potential barrier to progress on tackling this issue is the current short-term allocation of budgets to research funders such as Innovate UK. Adopting a long-term financial approach to major UK funding bodies may unblock this issue and enable longer term strategic planning of funding calls.

Recommendation

Set long-term budgets for funding bodies and increase the flexibility of funding calls. Increase the number of funding programmes with long funding call notice periods or with a fixed annual calendar of future funding windows to facilitate longer-term application planning and enable large scale companies and collaborations to participate. Certain agencies, such as UK Research and Innovation (UKRI) and Innovate UK, should be set long-term spending allocations and be given greater flexibility to budget across multiple years to manage longer-term programmes and avoid underspends.

Implement existing recommendations for university spin-outs

Spin-out creation requires the presence of a pathway to commercialisation and an understanding of the innovation journey. Our evidence showed a relatively common issue occurs when the spin-out process happens too early and the innovation is nascent, without a clear route to commercialisation. This often happens because the research is at too high a technology readiness level (TRL) to qualify for research council funding to keep it within the university until it is ready to spin-out.

Incubation funding for later-stage R&D could help to keep businesses in universities longer until the innovation is more mature. Therefore, the recent announcement by UKRI to provide £20 million proof-of-concept funding to support university spin-out formation and ensure financial sustainability for commercialisation is very welcome (46).

The subject of the UK spinout environment has also been the subject of extensive consultation and review recently in the Independent Review of University Spin-out Companies, published in November 2023 (17). It now falls to the Government to fully implement the recommendations from this review, which it has accepted in full (47).

Recommendations

Implement the recommendations of the Independent Review of University Spin-out Companies to strengthen and incentivise research commercialisation. The UK Government has accepted all the recommendations of the review and needs to ensure that implementation of the recommendations is sufficiently resourced.

Conduct a timely evaluation of the UKRI proof-of-concept funding programme for supporting university spin-outs. The UK Government should conduct a timely evaluation alongside the implementation of this fund to ascertain its effectiveness and, if deemed successful, expand the proof-of-concept into a full-scale programme as soon as possible.

Access to infrastructure

We heard from our discussions that there are challenges around access to R&D infrastructure that supports businesses to scale and grow. The UK Innovation Strategy (2021) included a £50 million portfolio for the UKRI to invest in infrastructure projects (41) and the progress report on the Science and Technology Framework included numerous funding allocations and updates on physical and digital infrastructure projects (2).

Despite these welcome developments, a coordinated funding strategy and sustained service support will be needed to maximise the use and value of any new infrastructure assets. In addition, certain aspects of R&D infrastructure provision and access have barriers that need addressing. It is a good first step that the National Planning Policy Framework recognises the need to consider the requirements of different sectors, including clusters or networks of knowledge and data-driven, creative or high technology industries (48). However, a consultation announced in 2023 as part of a life sciences growth package around adding R&D requirements to the Framework has yet to take place (49).

Increase availability of scale-up spaces

Of particular concern is the shortage of specialised space for early-stage businesses that require larger spaces as they scale-up. This lack of facility space is well documented in the biotech industry (22,28). This is a particular issue in the Golden Triangle (Cambridge – Oxford – London), with a critical shortage of specialist laboratory space for life sciences businesses (28).

It has been reported that laboratory vacancy rates are just 1% in Cambridge and London, and 7% in Oxford (28). Lack of access also extends into other highly technical R&D intensive industries, such as chemistry (37) and the physical sciences, as well as other regions of the UK.

For example, one report states that 17% of physics innovators highlight a lack of access to suitable equipment and facilities, which increases to 30% in the Yorkshire and the Humber and the North East (50). Early-stage businesses are unable to commit to longer leases and will often have rapidly changing needs as they grow (28). A further missing scale-up infrastructure capability is the intense competition for space in the final production stage of product development, which can lead to smaller enterprises taking their economically valuable production activity abroad (22).

Recommendation

Prioritise and incentivise R&D facility development projects. Update the National Planning Policy Framework to prioritise the development of new R&D facilities, such as research laboratories or manufacturing facilities, within national and local planning regimes. Establish local taskforces to coordinate and drive the delivery of new R&D facility planning proposals across the UK. Including capital R&D investments, such as laboratory space, as an eligible cost for R&D tax relief would be a further way of incentivising investment in R&D facilities.

Case study: AviadoBio

AviadoBio is a spinout company that emerged from the UK Dementia Research Institute (UKDRI) at King's College London (KCL). Building on the discoveries of Professor Chris Shaw (UKDRI group leader), AviadoBio is developing novel gene therapies for frontotemporal dementia and motor neuron disease (MND). AviadoBio has raised $96 million in private financing since its founding from leading life-science investors.

AviadoBio grew out from KCL in 2020, a decision that was accelerated by the Covid-19 pandemic. Despite a wealth of office space available at this time, a lab space suitable for 5-10 people was not available in London, as many potential facilities had long waitlists. Options in Cambridge and London were similarly scarce, and London was the preferred location for its current and future workforce.

Eventually, the team found a space above a jewellery store in London's Hatton Garden. This was a space that had been refurbished and retrofitted for laboratory use by a previous biotech company who had since outgrown it. Finding this was a "painful exercise, but the only option", the company said. "We only found this space from a serendipitous connection from an investor." This process took nearly a year from when the company started looking to moving in.

The company has since grown to more than 60 people and it continues to expand. There have been similar challenges in finding new premises. From Hatton Garden it joined a waiting list at QMB Innovation Centre and eventually secured another lab space there, but this required some redesign. It also took on extra lab space at development company Kadan's Sycamore House, as part of the Cell and Gene Therapy Catapult's new laboratories in Stevenage.

Suitable spaces were difficult to find, partly because at this stage the company was too large for a bioincubator but too small to take on the financial commitment of a multi-million pound, commercial 10-year lease. The team considered all options including fitting out a space themselves. Over several years, a lot of time and effort has been spent addressing the issue of lab space, managing bureaucracy and talking to agents and developers.

At one stage, the company was being run across four sites (three labs and an office in Holborn). Running an organisation across multiple locations was difficult, but the only option to accommodate the company's rapid growth. The AviadoBio team has been seeking to consolidate into one site ever since. In 2024 the company will finally move into a new commercial office and laboratory building in Canary Wharf.

Note: AviadoBio acknowledged that there are several commercial lab buildings under construction at the moment in and near London, which may address the problems it experienced in the future.

Support infrastructure access relationships between sectors

Differences in approach and cultural mindset between sectors (such as universities and businesses) can cause issues for businesses trying to access existing infrastructure. Many SMEs lack the administrative expertise to manage the agreements and subcontracts required to establish access to university infrastructure and negotiate intellectual property (IP) arrangements.

Equally, university institutions may lack the commercial awareness to effectively manage the IP contribution to business collaborations arising from their assets. The loss of European Regional Development Fund (EDRF) funding due to the UK leaving the EU, which supported small business-university collaborations and building research capacity in places like Wales and the North East of England, will likely exacerbate this disconnect. There are existing schemes, such as Innovate UK Smart Grants (51), Knowledge Transfer Partnerships (52) and Catapult Centres (53), which support collaboration between business and academia that could go further.

Another crucial aspect of cross-sector infrastructure access is ensuring business R&D staff have appropriate technical skills to operate novel infrastructure. With many technological advancements in infrastructure emerging through university channels, there is an urgent need to upskill the industry workforce in certain sectors to keep pace with technological developments.

Recommendation

Promote, communicate and support existing collaborative opportunities for the business and academic sectors. The Innovate UK Smart Grant, Knowledge Transfer Partnerships and Catapult Centres should be expanded, and their funding allocations increased to allow more collaborations to access funds. The reach of these schemes should be increased to attract new applicants and, where relevant, greater support provided by UKRI at pre-application stages to enable participating organisations to effectively negotiate their contributions. Awards of varying lengths and contribution levels should be introduced to accommodate participation from businesses of different sizes and financial input capabilities.

R&D infrastructure must be considered as part of the wider infrastructure that supports it

There are challenges relating to wider enabling infrastructure (e.g. housing, transport, and utility supply) that create barriers to accessing and fully utilising R&D infrastructure across the UK. Therefore, R&D investment cannot be considered in isolation and must be considered in a wider context of investment across Government in other aspects of infrastructure including housing and transport.

The issues cited in our discussion include lack of access to affordable housing, transport links, and water and power supply issues delaying planning applications. For example, innovation locations in proximity to universities are frequently in densely populated areas with high rental and living costs. Whereas remote R&D infrastructure locations frequently suffer from a lack of transport links, such as local railway stations. These constraints can make it difficult for businesses to attract the right talent and grow their workforce.

Recommendation

Support R&D infrastructure through wider infrastructure improvements. R&D infrastructure cannot be considered in isolation and must be part of wider discussions about regional infrastructure and other policy considerations such as planning processes, housing, transport, and utility supply.

Case study: Imperial - White City Deep Tech Campus: Creating the conditions for UK innovation to succeed

Imperial's White City Deep Tech Campus – at the heart of the White City Innovation District and part of the wider Imperial West Tech Corridor – creates the conditions for innovation and entrepreneurship to flourish. The Imperial WestTech Corridor is a world-leading hub for innovation, entrepreneurship and technological advancement.

The White City Deep Tech campus brings together scientists, engineers, clinicians, innovators and entrepreneurs to inspire new ideas, pioneer new ways of working and support commercialisation in an ecosystem that provides wide-ranging access to cutting edge equipment, facilities and expertise. A network of innovation spaces, including Imperial's White City Incubator and a range of accelerators, provide access to facilities and Imperial's professional expertise on research and innovation to support businesses to grow and flourish.

Access to cutting edge technologies and facilities creates rapid prototyping environments for testing new ideas and product development. For example, the Agilent Measurement Suite, based in the Molecular Sciences Research Hub, provides state of the art analytical equipment and unrivalled capabilities for researchers and businesses from Imperial and the local area to apply the latest measurement technologies to their research. Almost half of the equipment time in the Agilent Measurement Suite is currently utilised by external companies and industry partners, including Imperial student start-ups and staff spinouts.

The Royce Institute at Imperial in the Sir Michael Uren Biomedical Engineering Hub brings together industry and academia, locally and across the UK, to make, test and characterise materials, components and systems. With a vast array of equipment worth over £150 million across the national Royce Institute network, users can access and utilise cutting-edge resources while benefitting from the expert technical support offered by the Royce team. Co-location of Royce Institute facilities in universities not only provides collaborative opportunities for Imperial academics but also for our industry partners, such as White City-based Solena Materials, a company utilising the Royce facilities in their endeavours to create new proteins for textile applications.

Likewise, Imperial's Advanced Hackspace is a highly accessible environment for inventors, hackers and makers to turn their ideas into breakthrough prototypes and solutions. It provides access to specialist manufacturing equipment, including a well-equipped bio lab, state-of-the-art 3D printing, electronics, metalwork and woodwork equipment, alongside training and a community of like-minded members. With a dedicated junior Makerspace for local school children, Imperial also aims to inspire, and develop the skills of, the next generation of leaders, inventors and entrepreneurs. Imperial student start-up Multus started their journey in the Hackspace, where their idea to create an animal-free feedstock for lab-grown meat came to reality, with the company since raising £8m to develop a manufacturing facility and scale their business.

Just as important for companies as the access to physical infrastructure is the support of Imperial's academic and technician experts. Imperial also recognises and facilitates vital networking opportunities across the research community to foster knowledge exchange, spark new collaborations, and nurture a culture of open innovation and entrepreneurship. Initiatives include drop-in clinics, hackathons and talent exchanges, as well as a range of deep tech networks and events, fostering the skills, ideas and solutions that will tackle the world's greatest challenges.

Leverage regional strengths in R&D

Strengthening local and regional economic growth through R&D investment is a continuing priority for all of the three main political parties (54). Investing in regional R&D can play a significant role in delivering a more research and innovation intensive UK, and create opportunities for new jobs and industries across all parts of the UK. In the 2023 Spring Budget, the Government launched the refocused Investment Zones programme, based on high-potential knowledge-intensive clusters across the UK to be based around universities, to accelerate research and innovation in the UK's most promising sectors (55). Three Innovation Accelerators in the West Midlands, Greater Manchester and Glasgow are part of a pilot programme led by Innovate UK and designed to increase the local economic impact of R&D. In the 2024 Spring Budget, the UK Government continued to focus on 'levelling up' and emphasised further devolving power to local administrations and leaders who are best placed to promote growth in their regions (25).

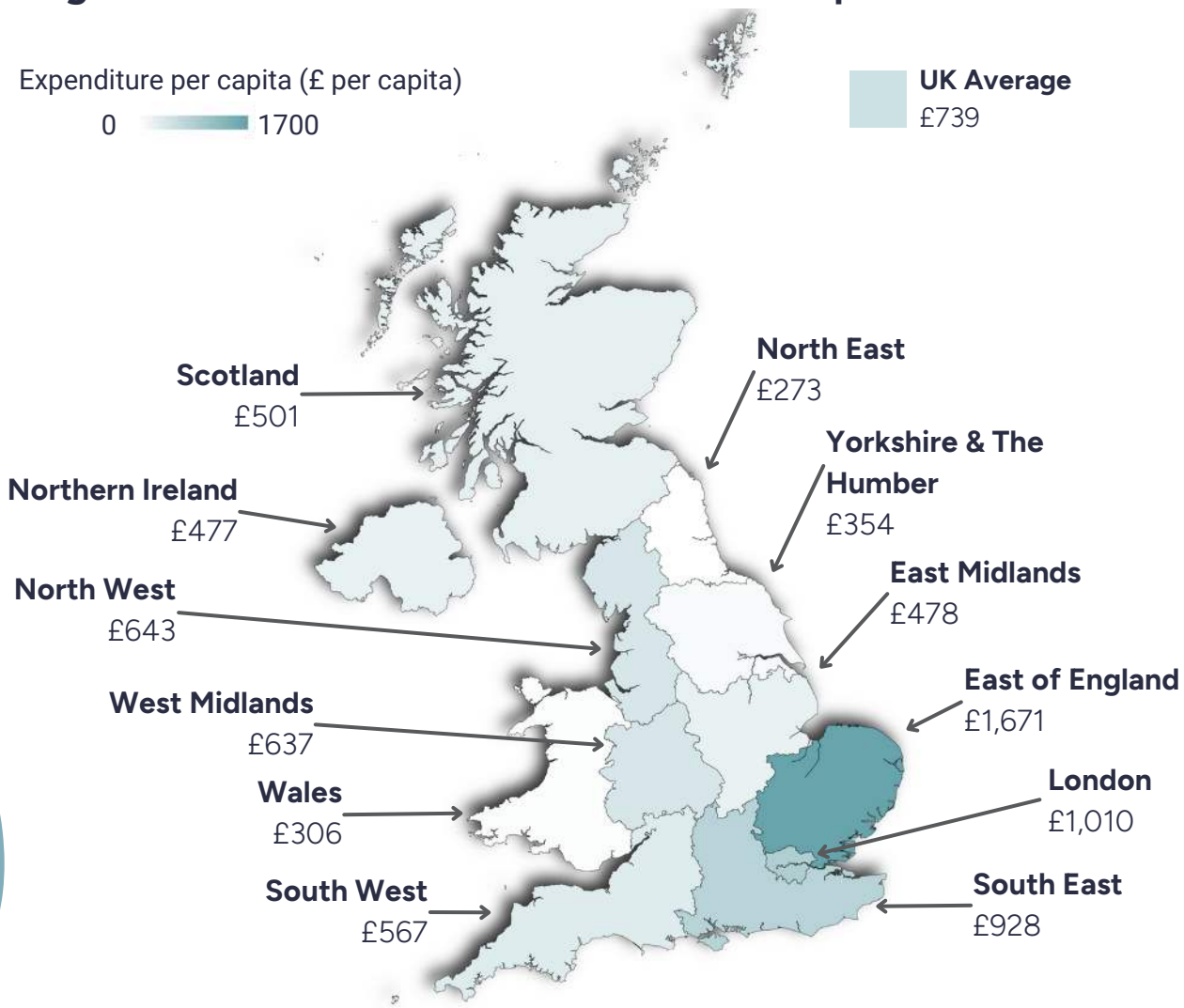
However, our evidence showed that there is plenty of scope to further strengthen local innovation ecosystems to improve R&D investment opportunities across the UK. Depending on where you are, location can be either a challenge or an enabler to business R&D investment. Outside of the Golden Triangle, access to venture capital has been reported to be a particular problem (37).

The latest BERD data for the UK in 2022 demonstrated the clear disparities in business R&D investment across the UK, with most business expenditure taking place in the East, South-East and London, even after accounting for regional population size (Figure 2) (15).

CaSE's opinion polling has shown support for regional and local R&D among the public. Results from a March/April 2024 poll suggests that the public connect business-led R&D and economic growth (56). A majority of respondents (78% of 2,011) supported a proposal for a business to set up a local research facility, with the main advantages cited as boosting the local economy (selected by 58% of respondents) and providing jobs for local people (55%).

While the UK Government needs an overarching national strategy, it is important to provide regions with the funding and the freedom to enact effective policies at a local level. This is the case with the three pilot Innovation Accelerators, which are intended to show that local governments can be trusted to use central government funding to strengthen innovation ecosystems and improve local capacity for research and innovation.

Regional Distribution of UK Business R&D Expenditure



2022 expenditure on R&D performed by businesses across UK regions in £ per capita

Sources: ONS Business enterprise research and development, UK: 2022, - ONS Estimates of the population for the UK, England, Wales, Scotland, and Northern Ireland: 2022

Our evidence also highlighted that successful innovation clusters often have an anchor organisation and local leaders that can pull people together and that are empowered to drive things forward. However, there has been considerable oversight by central government, for example in signing off on investment and projects, and challenging each business case. It was suggested that excessive oversight can use up a lot of time, which would be better spent developing expertise to support regions in their capacity to drive things forward.

Recommendation

Give regions the freedom to make decisions about local innovation programmes. The UK Government should support local authorities and businesses to build an innovation offer on behalf of a region with the funding and freedom to enact effective policies at a local level. This could be done through an expansion of the Innovation Accelerators programme. Local authorities should be empowered to make their own decisions about innovation investment and to drive things forward without excessive oversight from central government.

Support collaboration and promotion of collective R&D strengths

We heard from our discussions that it is important to create a UK environment that is collaborative rather than competitive between regions. This could include supporting collections of places with related strengths to work together and explore collaborative opportunities to attract investment for a region.

Place-based collaborative networks between different types of organisations could support longer-term planning in a region and support collaborative opportunities in R&D. This can include links between civic bodies (such as combined authorities) and local organisations and other groups such as universities and businesses involved in R&D.

For example, the Oxford Road Corridor in Manchester is a partnership between universities, the NHS, businesses, and the property company Bruntwood. Another example is the Northern Health Science Alliance, which brings together ten universities and nine research intensive NHS Trusts in the north of England. These partnerships have brought together relevant stakeholders and helped to support longer-term planning for their regions.

Support regions in building a 'brand'

Places should be supported in building a reputation and brand, which itself attracts businesses (54). Branding includes the promotion of cities and city regions, as well as innovation ecosystems, to render them attractive in the boardroom.

Businesses are often looking for the presence of factors such as access to skills and talent, accommodation for staff and good transport links. A small number of leaders can have considerable impact in the branding of a place. Manchester was cited as an example of how leaders are able to work both locally and at national level to pitch the region's brand in a compelling way.

DSIT has launched a new UK innovation Cluster Mapping Tool, which highlights regions of sector-specific R&D intensity in the UK (1). This tool is a promising step towards building on existing R&D excellence and develop regional branding for innovation, by helping private investors identify and support local R&D firms situated in areas of regional strength. Maintaining and promoting this new resource will be essential.

Recommendation

Support regions to market their strengths and capabilities in order to attract inward investment. Foreign direct investors require a better understanding of different localities and their strengths and capabilities to navigate an ecosystem and make R&D investment decisions. The presence of a strong brand internationally can help to provide certainty to businesses. This could be coordinated through the Office for Investment as recommended in the Harrington Review.

Build capacity for innovation

Our discussions highlighted that it is important to connect and scale innovation capacity in regions to ensure they are ready and prepared to benefit from innovation support, such as the Investment Zones and Freeports, which provide tax and customs incentives and a range of other support in locations across the UK.

Not all regions benefit from the presence of research and innovation infrastructure able to support all stages of the pathway to commercialisation or the civic leadership structures to drive forward on the innovation agenda. While many places have strong universities, they can lack a translational research institute that can fill a gap in the R&D pathway.

It was also suggested that if the UK wants to become more innovative, it needs a strategy to better link regions and drive the dispersal of innovation activity, for example through investing in better connecting towns and cities, institutions and people.

Regional skills

The availability of skilled workers has a major influence on business R&D investment decisions; numerous surveys have indicated that a lack of skilled applicants to fill R&D roles is one of the key barriers to investing in innovation (21,57–59), with similar evidence presented across our roundtables.

CaSE's report The Skills Opportunity (18) explored the challenges the UK faces in R&D skills provision and provided recommendations on how to tackle them. The box below draws out elements of that report that are particularly pertinent to the environment for business R&D.

When leveraging regional strengths, it is important to consider the relationship between local skills provision and research activity (18). Our discussions suggested that skills availability and development is an integral factor in building up regional capacity for innovation. However, we also identified the need for sector engagement in addressing uneven regional distribution of R&D activity and workforce (59).

The R&D workplace is rapidly evolving due to a range of factors, such as digital advancements and pro-sustainability agendas, which are changing the types of skills that employers need (60,61). Proximity to universities can be a strong selling point for business locations, yet the specific skills shortages that businesses face are not always communicated effectively to the education institutions that train the local graduate talent pool.

Efforts to grow regional R&D capacity will therefore require close collaboration with local industry stakeholders alongside strengthening local skills policy and provision pipelines. It is important to ensure that businesses are involved in the design and development of Local Skills Improvement Plans, an initiative funded by the Department for Education to better match training provision to employer skills demands.

Recommendation

Align local education provision with changing employer skills requirements. The UK and devolved Governments should develop mechanisms to promote future skills training that aligns with changing labour market demands. Sponsorships from local businesses to provide training and building partnerships between regional industry and education providers to provide joint curricula could help to bring in employer input. Local Skills Improvement Plans need to engage with businesses.

The Impact of Skills Availability on Business R&D Investment

CaSE's 2023 report, The Skills Opportunity (18), explored the challenges the UK faces in R&D skills provision and provided recommendations on how to tackle them. Here we draw out elements of that report that are particularly pertinent to the environment for business R&D.

Provide incentives and support for employers to upskill their workforce

There is a perceived risk to return on investment for businesses who invest in training employees, particularly if the trainee then moves on to a new employer.

- The Treasury should introduce a tax relief on skills investment for businesses, or similar support, to incentivise offering better training for employees.

Promote regional opportunities to support the distribution of skilled workers

Attracting and retaining local skills requires raising awareness about opportunities across the UK. Young people are insufficiently exposed to education and career opportunities with local employers, nor the breadth of R&D-related roles available in their local area.

- The UK and devolved Governments should ensure careers programmes highlight the breadth of regional and local R&D opportunities and support them to make connections with local businesses.

De-risk and simplify hiring overseas talent

Recruitment of international talent is burdensome for UK employers. Navigating the UK visa system often requires considerable resources and expertise. Businesses covering visa charges also face greater hiring costs and risk losses if sponsored applicants withdraw.

- The Home Office should develop support with clear signposting to help applicants and businesses navigate the visa system, particularly for SMEs.
- Introducing a banding system for visa sponsorship fees could reduce costs for smaller businesses.

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