Mapping the economic returns of R&D in the UK

July 2025

The British Academy

CaSE
Campaign for Science and Engineering

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Campaign for Science and Engineering (CaSE) is the leading independent voice for UK R&D. It is a charity supported by a diverse membership including businesses, universities, professional bodies, research charities and individuals. Its members span the whole breadth of R&D – including discovery research, science, engineering, and innovation across the public, private, and charitable sectors. They collaborate with members, partners and the public to lend a clear, expert voice to decisions about research and development. They specialise in developing non-partisan, responsive solutions that help research and innovation to thrive in ways that improve people's lives and livelihoods.

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Why an economic analysis of R&D and innovation?

Innovation is a significant driver of productivity and economic growth, leading to new products, services and processes. Innovation can spur growth by creating new markets and improving productivity; increasing competitive advantage in a global market; creating skilled jobs across the UK; and having spillover effects across sectors.[1] To capture these benefits, the UK Government has made historic commitments to public investment in Research and Development (R&D), with long-term targets and a strategy to achieve status as a world leader.[2]

However, to maximise the returns on public R&D investments, it is important to consider interconnected (and often iterative) innovation processes, including not only R&D but also commercialisation and adoption.[3] Alongside the major commitments to public investment in R&D, changes to the Office for National Statistics (ONS) Business Enterprise R&D (BERD) survey methodology suggests that business investment in R&D is higher than previously thought.[4] However, the UK is still seeing stagnating productivity and economic growth. It is timely then to consider how R&D capability works within a wider innovation ecosystem. This ecosystem includes the composition of R&D investment, and implications of this on spillover effects, alongside absorptive capacity, adoption and diffusion.

This synthesis provides an overview of key findings from a jointly commissioned and competitively awarded analysis by the British Academy and Campaign for Science and Engineering (CaSE) from Cambridge Econometrics.[5] The independent analysis from Cambridge Econometrics provides an in-depth picture of the UK's research, commercialisation and adoption capabilities for ten different technologies and processes. In this briefing, we seek to draw out the key policy implications of this work, and to contribute to the evolving picture of the UK's innovation ecosystem, including its strengths and weaknesses across major technology and process innovation pathways.

This work builds on the Academy's and CaSE's substantial existing research and policy work on the role of R&D and innovation in the UK economy and society. *The Economic Significance of the UK Science Base* is a widely cited piece of research on the economic benefits of R&D investment, commissioned by CaSE and produced by Alan Hughes and Jonathan Haskel in 2014.[6] *Understanding SHAPE in R&D* draws together long-term research conducted by the British Academy on the value and representation of SHAPE R&D across the economy.[7]

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1 Department for Science, Technology and Engineering and Frontier Economics (2024) *Returns to Public Research and Development (R&D)* [June 25].

2 ONS (2024) 'Research and development expenditure by the UK government: 2022' [June 25] and GOV.UK (2025) 'Transformative £86 billion boost to science and tech to turbocharge economy, with regions backed to take cutting-edge research into own hands' [June 25].

3 British Academy (2025) *Generating coherent and effective R&D and innovation policies* [June 25].

4 ONS (2024) 'Update on transformation of research and development statistics: May 2024' [June 25] and ONS (2024) 'Research and development expenditure by the UK government: 2022'. [June 25].

5 Brown, A., Nelles, J., Robinson, L., Seymour, D., Reyes, Y. (2025), *From Research to Productivity: A systems analysis of UK innovation pathways*, Cambridge Econometrics [June 25].

6 Haskel, J., Hughes, A., Bascavusoglu-Moreau, E. (2014), *The Economic Significance of the UK Science Base*, CaSE [June 25].

7 British Academy (2023) *Understanding SHAPE in R&D: Bridging the evidence gap* [June 25].

Executive summary: Innovation pathways

In 2024, the British Academy and CaSE commissioned Cambridge Econometrics and the Innovation and Research Caucus to conduct a systems-based analysis of the UK's strengths and weaknesses within the UK's innovation system.[8] The report assesses the UK's performance in research, commercialisation and adoption by examining ten technologies. It provides detailed case study analysis and comparative evidence with a view to identifying the most promising points of government intervention within the innovation system.

To better understand the UK innovation system, the report uses ten case study technologies chosen to represent a range of sectors and disciplines. These case studies align with the previous Government's (2022-2024) 2023 Science and Technology Framework,[9] and the eight "growth driving" sectors and wider framing of the current Government's modern industrial strategy green paper.[10] The ten technologies analysed in this report include:

- Agricultural gene editing
- Artificial intelligence
- Industrial robotics
- Innovative galleries
- Mobile technologies
- mRNA vaccines
- Modern supply side economics
- Offsite construction
- Quantum technologies
- Semiconductors

The report takes a systems approach to capture and measure the non-linear and interconnected processes underpinning innovation. This approach offers a useful framework for assessing how research, commercialisation and adoption interconnect and influence each other to create feedback loops.

The analysis also shows that distinct differences in dynamics appear between sectors that produce goods and services that can be sold internationally (tradeable), and those that are primarily developed within the domestic market they serve (non-tradeable). A central finding is that while the UK has strengths in creating knowledge, it faces barriers in capturing value from technology-based innovation pathways. However, these barriers differ depending on specific technology and market characteristics.

The aim is not to highlight innovation 'winners' or to put these example technologies in direct comparison with each other. Rather, it is to highlight that an understanding of market structures and a tailoring of policy approaches may help generate better economic returns on R&D and innovation investment.

The next section of this synthesis draws out key policy implications from the report's findings.

8 This followed a competitive tender process: British Academy and CaSE (2024) 'Invitation to tender – Economic Analysis of R&D' [June 25].

9 Department for Science, Innovation & Technology and Prime Minister's Office (2023) *The UK Science and Technology Framework (March 2023)* [June 25].

10 Department for Business & Trade (2024) *Invest 2035: the UK's modern industrial strategy* [June 25].

Policy insights and implications

In this section, the British Academy and CaSE set out four major policy implications arising from the research conducted by Cambridge Econometrics. These implications are accompanied by their potential impact on UK Government policymaking.

Policy Implication 1

The continued uplift in R&D investment by the UK Government is likely to support the wider innovation system.[11] There is a persistent myth that the UK is 'good at research, and bad at commercialisation'. However, this report shows that strengths within the research base have an impact throughout innovation pathways, whether that be at commercialisation or adoption.

To maximise the value of inputs of research to commercialisation and adoption activities, more specific interventions for different value chains need to be created (please see Figure 1, p.7). There is no one 'input/output' model. It is possible to have strengths in both research and adoption, and for both to mutually reinforce one another, generating social and economic benefits. This is particularly important for tradeable technologies, such as the adoption of semiconductors benefiting productivity in other industries and vaccine uptake boosting workforce health and productivity.[12]

Continuing to maintain the UK's strength in fundamental research will enable value capture at adoption and diffusion. A strong research-base for a specific technology or process innovation produces value not only directly from the innovative product itself, but also indirectly through generating highly skilled researchers and graduates who can support adoption and diffusion. The spread of employees with R&D training into the UK workforce is a vital component in creating demand, adaptability, and absorptive capacity for innovation in UK firms and public services.

Policy Implication 2

Government intervention should not take a one-size-fits-all approach and instead adopt targeted approaches to capture value from innovation processes. The approach taken should vary depending on the characteristics of a technology or process's innovation pathway.[13]

Technology and process innovation systems exhibit different dynamics depending on sector and technology family. This in turn impacts how the UK captures value from technology- or process-based innovation, with implications for the optimal nature and timing of government intervention.

Improving interventions will require a coordinated approach across government, as individual government departments may have different interests in where to capture value, aligning with interventions at different stages of the innovation pathway. For example, with mRNA vaccine technology, the Department for Science, Innovation and Technology may be more

11 Brown et al, *From Research to Productivity*, pp.65-6.
12 Ibid, p.3.
13 Ibid, p.2.

inclined towards value capture at the research and discovery phase, while Treasury at the commercialisation phase and the Department of Health and Social Care may be more focused on the benefits of adoption and diffusion.

The R&D sector and Government can productively explore impactful policy solutions to support innovation through the framework proposed in this research. This could have implications, for example, in identifying the specific policy levers required to support innovation sub-sectors within the eight "growth driving" sectors of the Industrial Strategy.[14]

Policy Implication 3

While the UK Government's current focus on driving commercialisation and adoption through the Industrial Strategy and Science and Technology Framework is supported by this research, it also shows that **intervention can be optimised based on market structure and characteristics.**[15]

Some technologies, such as semiconductors and quantum technologies, require policy to take a more international perspective on value capture opportunities.[16] The Government currently has a strong focus on retaining scale ups, and there will be many innovations where the UK has both the research strengths and sufficient market size to warrant interventions that incentivise commercialisation within the UK.

However, for other innovations, such as certain areas of medical R&D, a larger, global market is often necessary to scale commercialisation successfully.[17] This analysis suggests that, for these areas, the UK Government could instead focus more on interventions supporting adoption to capture value, especially if we have existing strengths at the research phase.

Policy Implication 4

Alongside the potential contingency of approaches to research, commercialisation and adoption on market characteristics, **policy approaches to innovation require connected support to other areas, including housing, transport and infrastructure, and skills development.**[18]

Such a connected approach includes supporting the current strengths of the UK research base. Research undertaken at universities bolsters commercialisation and adoption of technology and process innovation.[19] The strength of our R&D ecosystem cannot be separated from higher education instability. If we want to continue to benefit from the UK's research base, financial challenges in the higher education sector need to be addressed.

The report's findings highlight that policy levers cannot be pulled in one area of the system alone, but rather, must work holistically with a realistic, and tailored, understanding of potential economic opportunities within the UK innovation ecosystem. This is particularly important where product or process innovation adoption may be impacted by (and impacting) regional inequalities.

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14 DBT, *The UK's Modern Industrial Strategy.*
15 Brown et al, *From Research to Productivity*, p.67.
16 Ibid, pp.34-9.
17 Ibid, pp.44-6.
18 Ibid, p.9.
19 British Academy, *Generating coherent and effective R&D and innovation policies.*

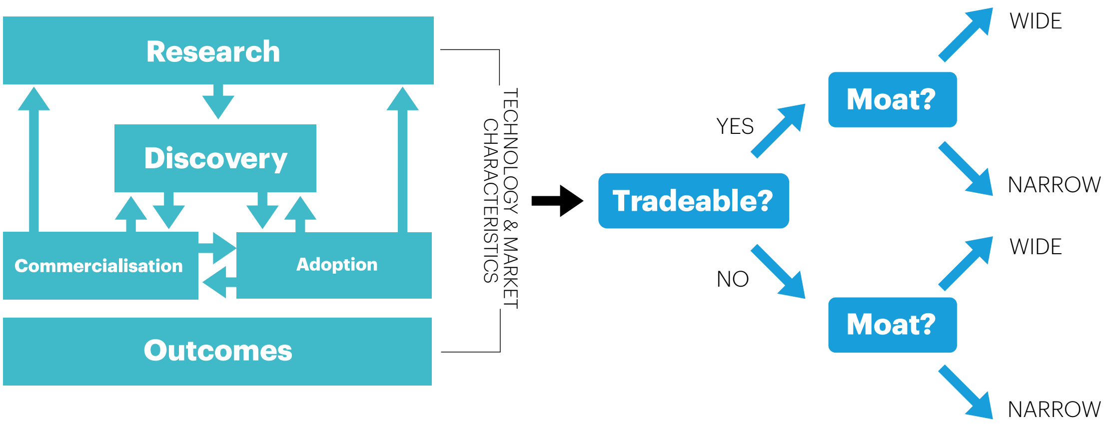
Innovation process mapping

To visualise and conceptualise the non-linear connections and relationships between R&D, commercialisation and adoption, the authors developed a theoretical innovation process map.[20] This map (see Figure 1) provides a conceptual framework to explore processes and markets across the ten technologies. It depicts how knowledge chains – the set of steps through which ideas are developed into economically useful outputs – interact with specific value chains. In other words, it visualises the iterative and non-linear process(es) through which raw materials, knowledge and ideas develop into products and processes.[21]

How to read the map

The system map first outlines elements of the innovation 'process', with stages moving between research, commercialisation and adoption of process and product innovations. This should not be read as a linear process from top to bottom, but rather as an interconnected process, with both the 'supply' of new ideas originating in research and discovery, and demand providing incentives for product and process innovation, stimulating research activity.[22] These stages are indicated on the left-hand side of the simplified illustration below.

Figure 1. Simplified illustration of the innovation process map measured by Cambridge Econometrics and determinants of an innovation and market characteristic



Source: Innovation Pathway Map adapted from Brown et al (2025)

The map also provides a framework, or decision tree, in order to understand the market characteristics of product/process innovations. First, it distinguishes between two types of innovative outputs from the technology in different sectors:

- **Tradeable innovations** – highlighting those sectors that produce goods and services that can be sold and traded internationally.
- **Non-tradeable innovations** – highlighting technology and process innovations specific to domestic value chains, which are primarily developed within the domestic market that they ultimately serve.[23]

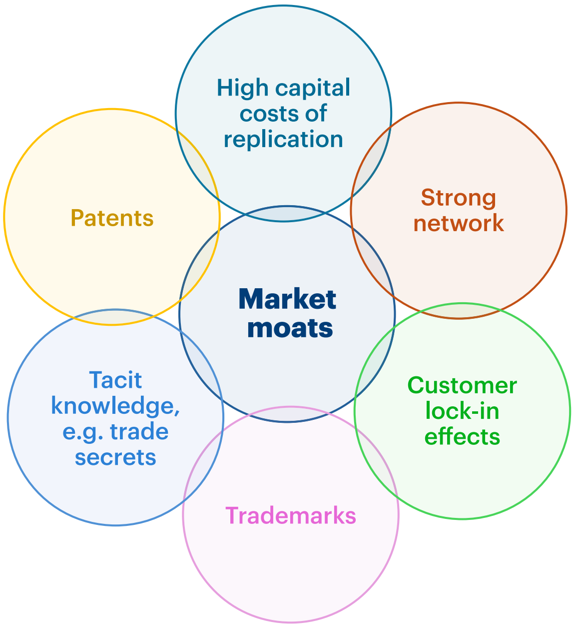
20 Brown et al, *From Research to Productivity*, p.13.
21 Ibid, pp.11-13.
22 Ibid, pp.11-12.
23 Ibid, p.11

The process map subsequently assesses the market structure and strength of competition effects for each innovation, considering the extent to which a company that developed a product is able to create protective 'moats' around that product or process.

- **Wide moat** – higher levels of protection around a product or process innovation that constrain competition, protecting the innovating company's market position from competitors.
- **Narrow moat** – lower levels of protection around a product or process innovation, meaning that an innovating company's competitive advantage and market share is more vulnerable to erosion by competitive pressure over time.[24]

Figure 2, below, visualises a number of factors that contribute to wider market moats. The presence of a moat is not automatically counter to positive innovation outcomes, with some elements, including patents, contributing to the adoption and diffusion of innovation.

Figure 2. Infographic showing factors that create wider market moats



Mapping market structures

The ten case study innovations explored in the report are grouped by their market characteristics – defined by the project team through quantitative indicators and qualitative research. Table 1 below provides of summary of how the specific technologies and processes analysed in the study map onto different moat sizes in relation to tradeable/non-tradeable innovations.

[24] Brown et al, *From Research to Productivity*, p.13. Please note, the original report uses the terminology high and low moats. The synthesis authors decided to use the terms 'wide' and 'narrow', as it was felt that this was simpler to visualise.

Table 1. Technologies and processes by market structure and characteristic

	Wide Moat	Narrow moat
Tradeable	• Agricultural gene editing • Artificial intelligence • mRNA vaccines	• Industrial robotics • Quantum technologies* • Semiconductors
Non-tradeable	• Innovative galleries	• Mobile communications • Modern supply side economics • Offsite construction

* While quantum technologies are likely to become a globally integrated market, their position in this framework is caveated, as market outcomes are not yet clear.

Source: Adapted from Brown et al (2025).

For each case study, the authors examine whether there are wider or narrower moats around the innovation and the nature of these moats. The nature of these moats can include a range of characteristics, as highlighted in Figure 2 above.

Broadly, for **tradeable technologies and processes**, research, commercialisation, and adoption occur at different rates in different places, and nations can become more or less competitive at capturing value at these different stages.[25] Importantly, strengths or weaknesses in one area do not necessarily influence other areas, i.e. it is possible for the UK to be strong in research, weak in commercialisation, and strong in adoption.

For **non-tradeable technologies and processes**, or those that primarily operate in a domestic market, research, commercialisation, and adoption tend to occur in domestic pathways, with commercialisation and adoption more tightly bound, often with a single actor or firm.[26] There is a high proportion of process-led innovation and direct implementation within firms. This means that downstream barriers, like skills gaps that hinder downstream firm adoption, can be a key limiting factor for implementation and diffusion.

25 Brown et al, *From Research to Productivity*, pp.61-2.
26 Ibid, p.63.

Table 2. Suggested government intervention based on innovation pathways and market characteristics

	Higher moat	Lower moat
Tradeable	**Findings**	
	A larger proportion of value generated is captured by firms in the commercialisation phase. There is significant additional value to be captured in better commercialisation of innovation in these sectors.	A larger proportion of value is generated at the adoption phase. Globally, high levels of adoption correlate with positive downstream outcome, but UK has a mixed record at adoption in these technologies compared to other developed nations.
	Possible policy levers	
	Support greater commercialisation of UK's research expertise, for example in genomics.	Focus on facilitating and incentivising individual firm adoption of these technologies.
Non-tradeable	**Findings**	
	While there are high levels of commercialisation and adoption, this can be uneven and highly concentrated. Passthrough to consumer surplus can be limited.	There are limited incentives for a sector to invest in the adoption of technology for which they are unlikely to capture the majority of value. However, these innovations have the potential to generate substantial social benefit.
	Possible policy levers	
	Focus on facilitating wider adoption to reduce market power of early adopters.	Focus on increasing incentives for developing and implementing technology.

Source: Adapted from Brown et al (2025).

Together, the market structure and characteristics of a given intervention provide a framework for policy intervention within technology- and process-based innovation. Table 2, above, provides an overarching framework for policy intervention within product- and process-based innovation pathways, depending on the market structure and characteristics of a given technology. You can find further detailed breakdowns of key findings and specific interventions for each case study technology in table 3 a-d, in the annex of this paper.

Annex

In the tables below, we outline the key findings and policy implications from the research for each case study in the report. This includes findings across research, commercialisation and adoption for each technology, across four tables grouped by market characteristics. We have used a red, amber, green (RAG) score for each process, based on the metric analysis and RAG score by Cambridge Econometrics. Each table also includes high-level policy implications for individual technologies.

Table 3a-d. Findings, RAG scores and suggested pathways for ten key technologies, based on innovation pathways and market characteristics

a. Tradeable and narrow moat technologies

	Industrial robotics	Quantum technologies	Semiconductors
Findings	**Competitive, globally integrated market that provides widespread productivity and consumer surplus benefits.**	**The technology is still at commercialisation stage – it is likely to become a globally integrated market, but it is unclear as to its exact nature.**	**Competitive, globally integrated market with high levels of downstream productivity diffusion and consumer surplus.**
Research	• Research in industrial robotics made up 0.18% of total UKRI funding between 2012-2022 and the UK ranked 6th in global citations. • 21st century developments driven largely by advancements in interconnected fields (machine learning and AI).	• The UK ranked 4th in publications on second-gen quantum technologies between 2000-2018 and the UK has research strengths across the university research base.	• The UK contributed to initial research into semiconductor physics and application. • However, recent performance in patents (ranked 8th globally) and citations (ranked 6th globally) has weakened.
Commercialisation	• Significant economic potential being held back by UK market structure in which firms feel less well-equipped to shoulder costs associate with adoption.	• Advances are being made in application of second-generation technologies. • The UK physics community has been a global leader and has a small but vibrant commercial start up community, with lowest mean age of 8 years across 42 firms.	• The UK decided not to develop/protect cutting-edge domestic fabrication facilities. • Currently, the UK industry is relatively niche, consisting of ARM and smaller firms with relative maturity.

Adoption	• UK severely lags in global adoption of industrial robotics systems with one of the lowest robot densities among major industrialised nations (101 industrial robots per capita, compared to global average of 151). • Lower levels of adoption might be attributable to a focus on short-term payback rather than longer-term total cost of ownership, as well as skills shortages and cyclical demand and reliance on cheap manual labour.	• It is anticipated that early adoption will be characterised by high integration costs and low short-term rewards, where improvement is incremental. • The strength of the research base suggests the UK has a community with the knowledge capability to be early adopters.	• The UK has benefited in adoption and there are no major barriers.

Policy Implications	• High levels of adoption correlate with positive downstream economic outcomes. The UK has historically struggled with successful adoption of industrial robotics technology, although a new supportive regulatory environment has been created to address this.
	• Policy strategies include encouraging adoption of technologies produced outside the UK.
	• Levers include:
	  ◦ Facilitating partnerships with academia and matching with preselected potential technology suppliers
	  ◦ Providing subsidised technology-specific training and institutes
	  ◦ Providing matched funding with technology upgrade fund.
		• Quantum Technologies are still broadly in their commercialisation and early adoption phase, and it is too early to tell what global market structure will emerge.
		• Policy strategies need to consider the dual opportunities of commercialising the technology as it emerges and ensuring early adoption alongside research.
			• High levels of adoption correlate with positive downstream economic outcomes. The UK has keenly adopted semiconductor-based devices and has therefore benefited.
			• Enhancing value capture would focus on building capacity to lead global commercialisation of new innovations in niche but potentially transformational sub-fields of semiconductor physics (for example, next-generation compound semiconductors).
			• Call for UK to undertake the establishment of the Semiconductor Infrastructure Initiative in full.

b. Tradeable and wide moat technologies			
	Agricultural gene editing	**Artificial intelligence**	**mRNA vaccines**
Findings	**A globally integrated market dominated by a small number of multinational corporations, in which historically stringent regulations have limited UK commercialisation and adoption.**	**A globally integrated market dominated by a small number of software firms, with productivity outcomes uncertain as AI continues to expand.**	**Market mirrors patterns of the pharmaceutical sector more broadly, which combines private and public research into primarily private sector commercialisation and public sector adoption.**
Research	• Research into and use of new genomic techniques in plant breeding remains contentious in UK, with a strict regulatory environment in agricultural gene engineering until 2023. • However, recent legislative changes and the prominence of engineering biology in "critical technologies" are creating new opportunities for innovation.	• Substantial research capability linked to UKRI AI Hubs and vibrant start-up community, but UK does not hold a large share of global market capitalisation. • The UK ranked 4th in citations globally, indicative of a strong research base; however, the UK has comparatively lower patent rates (ranked 8th globally), while data on public funding lags behind programme development.	• UK firms at the forefront of research, discovery and development, and are likely to remain globally competitive. • UK researchers generate 5% of global citations and nearly 5% of patents, with success of COVID-19 mRNA vaccines awakening interest in addressing other diseases.
Commercialisation	• Pathways of commercialisation are less well-developed due to the regulatory regime. • However, this is changing. Following the UK's exit from the EU and Genetic Technology (Precision Breeding Act) of 2023, commercial cultivation of gene-edited crops is allowed in England. • We can expect higher levels of commercialisation to happen in partnership with large agrifood companies.	• Received £8420 million in venture capital funding between 2019-2023, indicating a high level of confidence in commercial activity.	• Much value is captured by large commercialising firms, some of which are active, if not headquartered, in the UK. • The success of the COVID-19 mRNA vaccines has generated new interest in these technologies to address other diseases.

Adoption	• Most research conducted in UK is being adopted at greater scale by companies in other markets, such as US. • Only a small proportion of agrifood businesses can directly modify their own crops. • However, once a successful modification is developed, the new seed can be distributed across the entire industry. Careful regulation is required here.	• Widespread applicability of AI research across a variety of sectors, including finance, healthcare, transportation and logistics. • However, the UK has a score of 0.73/1 in the AI Preparedness Index by IFM, resulting in 14th position below leading nations. • Widespread adoption will likely have an environmental impact, including stress on energy sources.	• Societal and productivity impacts related to adoption of vaccines, such as preventing severe illness and reducing sick days taken by employees.
Policy Implications	• Agricultural industry would benefit from wider domestic commercialisation and adoption of globally traded products to capture more value of a growing global market. • Greater adoption of existing and emerging gene editing techniques can ensure reduced emissions, greater climate resilience, greater yields on small agricultural footprints, and improved domestic food security.	• Calls for UK to focus on facilitating simultaneous adoption and development of complementary technologies (e.g. AI and industrial robotics). • Adoption needs to proceed with caution within a carefully considered regulatory context and rapidly changing landscape.	• Building a pool of skilled workers and researchers means that, when UK firms are integrated into global markets, high-value jobs are likely to remain in UK longer. • Immediate role of UK likely to be less one of adoption and more one of development and commercialisation through partnerships with multinational corporations or supporting growth of wider spin-out, start-up and scale-up community.

c. Non-tradeable and narrow moat technologies			
	Mobile communications	**Modern supply side economics**	**Offsite construction**
Findings	**A single global knowledge chain serving multiple separate domestic markets, each at its own stage of technological development.**	**UK a leading hub for progressive economic policy ideas but these are not implemented consistently by government.**	**A competitive, non-tradeable sector with high replicability.**
Research	• UK ranks 5th globally for academic citations in mobile technologies, demonstrating strength of UK research base. • Investment in research hubs and collaborations with industry partners to make UK a global leader in 6G telecoms research.	• Research on economic policy originating within academia before being picked up directly by politicians and civil servants. • UK ranked 3rd in global citations between 2012-2022.	• Research and patenting activity is relatively strong despite weaker public investment.

Commercialisation	• 6G is expected to contribute up to US$1 trillion to global GDP by 2035, while estimated adoption of 5G technologies will add US$1.3 trillion by 2030. • However, the UK Government is behind in its target of nationwide, standalone 5G coverage in all populated areas by 2030. • This may indicate that the UK will struggle to deploy 6G networks when they become available.	• Difficult to track data on commercialisation metrics such as venture capital investment or start-ups. • UK makes up 4.5% of registered global think tanks promoting MSSE concepts (even if this terminology is not consistently used).	• Offsite construction technologies tend to be developed and implemented in-house by existing construction firms, rather than commercialised and sold as products to the industry by a separate group of (potentially global) upstream innovators. • Offsite modular construction (OMC) goes against many conventions in UK construction industry, with barriers around access to suitably skilled workers and risks of capital investment.
Adoption	• Rollout is mostly managed by private companies that decide when and where to locate network infrastructure. • High expectations of long-term impact from adopting innovative comms technologies.	• Inconsistency in adoption, and slow uptake, diffusion and promotion of MSSE ideas. • Requires legitimisation by key actors to create 'lock-in' and shift strong ideological leanings	• Take-up of offsite construction strong for new-build projects. • However, slow adoption of OMC methods an institutional issue, requiring a high level of collaboration in what is traditionally a competitive and low-margin industry.
Policy Implications	• A lack of incentives to the private sector firms responsible for the build-out of enabling infrastructure means UK Government lagging behind target of nationwide standalone 5G coverage by 2030. • While 6G promises productivity gains, it may also lead to job displacement in some sectors due to increased automation and optimisation.	• After 2024 elections and subsequent change in Government, there is potentially a policy window for MSSE ideas to be more thoroughly reintroduced to policy making in the UK.	• Calls for more widespread adoption to boost productivity impact and capture benefit for consumers through a reduction in the cost of new-build homes. • Obstacles to adoption include financial constraints, regulatory hurdles around procurement and payment, and a lack of skilled workforce. • More interventionist approach to procurement and land assembly needed to boost commercialisation and adoption. • Government could encourage adoption of OMC through public-private partnerships, grants or loans to help mitigate investment risk, technology mandates, and long-term procurement initiatives to build social housing projects by councils.

d. Non-tradeable and wide moat technologies	
	Innovative galleries
Findings	**A domestic, non-tradeable market with high levels of commercialisation and adoption, but uneven and highly concentrated.**
Research	• Strong academic research with 11% of global citations but only 3.2% of global patents. This could be explained by the relative youth (average firm age only 12 years) and small size (70 firms) of the industry. • Scholarly research not a significant driver of technology, as innovations are developed in practice and overlap with advancements in interconnected fields (machine learning and AI).
Commercialisation	• Strong levels of public funding, but knowledge and technology diffusion outside major cities has been weak, leading to the accumulation of market power by leading providers and limited customer surplus.
Adoption	• High levels of adoption (68% of UK museums report using interactive displays and visual projections). • However, adoption has also been uneven, such that rates and outcomes differ substantially between institutions (based on size, prosperity, and location).
Policy Implications	• Direct but difficult to quantify productivity factors, such as cultural impact, diversifying audiences and knowledge spillovers. • Policy leavers should focus on facilitating wider adoption to reduce market power of early adopters.

Source: Tables adapted from Brown et al (2025)

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